PENNSYLVANIAN AND PERMIAN FUSULINIDS

FROM NORTHEASTERN NEVADA

A Thesis
in partial fulfillment
of the Bachelor of Science degree
by Allan Young
The Ohio State University 1973

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Advisor, James W. Collinson

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INTRODUCTION

This fusulinid study is part of an investigation of the sedimentary petrology and environment of deposition of Upper Pennsylvanian and Lower Permian strata in northeastern Nevada being carried out by Jon Marcantel, a doctoral candidate at the Ohio State University. I accompanied Marcantel as a field assistant during June and July, 1972, and helped him to measure and collect several of the stratigraphic sections from which the fusulinids in this report came. This report is an attempt to provide biostratigraphic correlation for his studies.

136 samples were collected from 14 stratigraphic sections, which are indicated on the locality map, figure 1. Though exposures were generally good, most of the sections were complicated by small faults. Fusulinids were mainly studied and measured from acetate peels.

I wish to express great appreciation to Dr. James W. Collinson for his advice and assistance in this project. Some expenses were provided by National Science Foundation Grant GA-23904.

Riepe Spring Limestone

The Riepe Spring Limestone, named by Steele (1960, p.102), was originally included as part of the Ely Limestone of Spencer (1917, p.27) and Pennebaker (1932, p.163, 164). It consists of very fine crystalline bioclastic, medium to massive bedded limestone. Fusulinids in the formation at the type section at the north end of Ward Mountain near Ely, Nevada, suggest a Middle Wolfcampian age.

The Riepe Spring Limestone overlies the Ely Limestone. Near Eureka, Nevada, equivalent rocks are included in the Carbon Ridge Formation.

The Riepe Spring Limestone was encountered in the study area at Spruce Mountain Ridge (Sec. 2, T. 32N., R. 63E.), Nine Mile Canyon, Spruce Mountain (Sec. 20, 29. T. 31N., R. 64E.), Lone Butte, Brush Creed, the central Pequop Mountains, and the Schell Creek and Medicine ranges (see fig. 1).

Ferguson Mountain Formation

The Ferguson Mountain Formation has been redefined from Steele's (1960) Ferguson Spring Formation by Berge (1960). The type section is located at Ferguson Mountain in Nevada. The formation consists of fine-grained, gray silty, cherty, bioclastic limestone with interbedded shale. It also contains thick coralline beds and abundant fusulinids. Fusulinids from the type section suggest an age of Lower Missourian through Upper Wolfcampian.

To the west, rocks of equivalent age are included in the

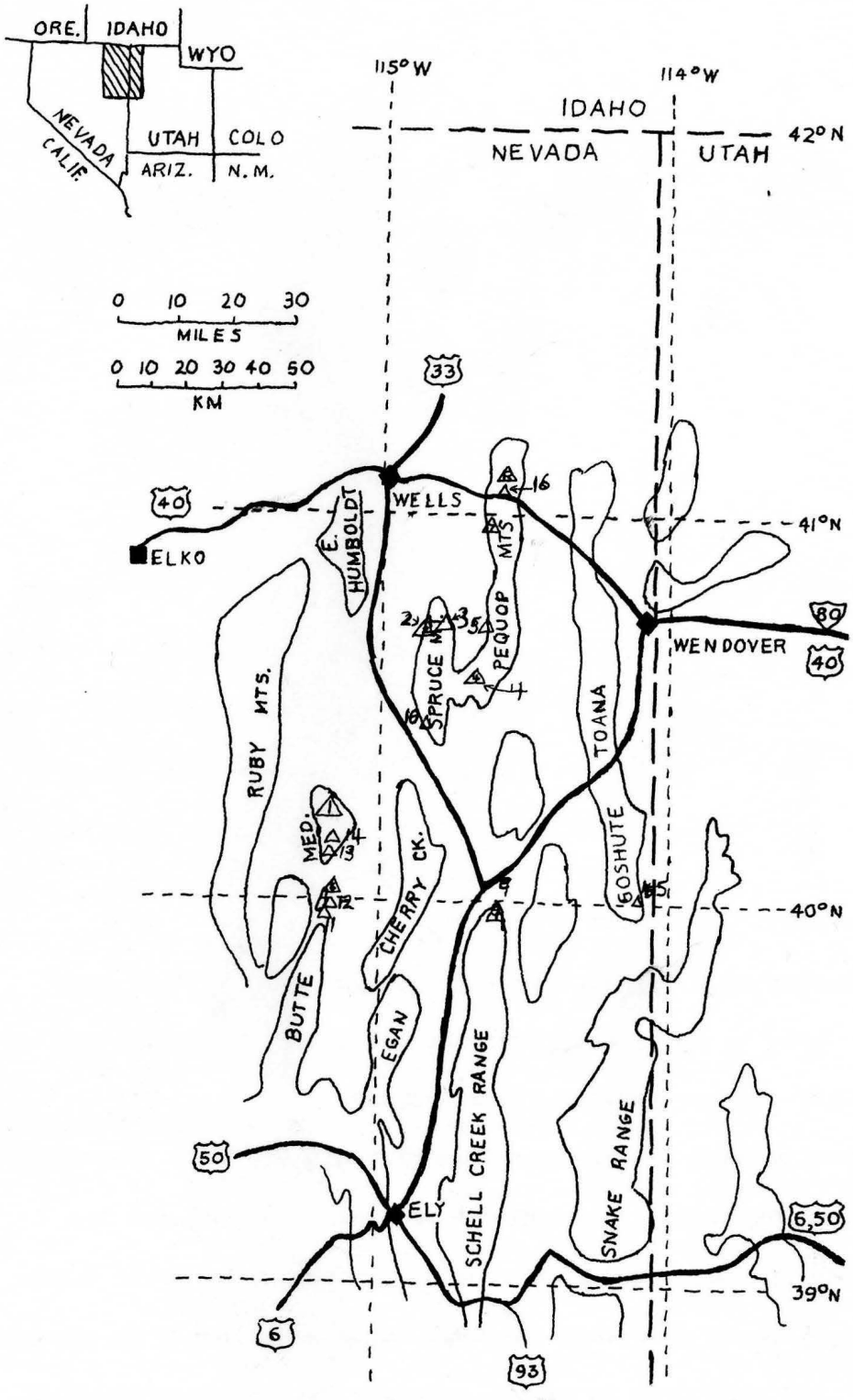
Riepe Spring Limestone and the Ely Limestone. The Oquirrh Formation to the east in Utah contains beds of equivalent age.

The Ferguson Mountain Formation is present in the study area at the type section at Ferguson Mountain (see fig. 1).

Pequop Formation

According to Steele (1959, p.1105), who named the Pequop Formation, it consists of three members, the Lower Moorman Ranch Member, the Summit Springs Evaporite Member and the Upper Moorman Ranch Member. These members were not recognized in the study area. In the type section the lithology of the Pequop Formation is described as unevenly bedded silty limestone. Fusulinid limestone is locally abundant. From fusulinid faunas Steele suggests that the Pequop Formation ranges in age from Lower Leonardian through Lower Guadalupean.

The Pequop Formation is overlain by the Loray Formation. This study includes the Pequop Formation from the Medicine Range, Spruce Mountain Ridge, Wood Hills, Lone Butte, Brush Creek, and the Central Pequop Mountains (see fig. 1).


ORE.
IDAHO
WYO
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COLO
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N. M.
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KM
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E. HUMBOLDT
MTS.
16
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80
WENDOVER
40
PEQUOP
SPRUCE M
RUBY MTS.
TOANA
GOSHUTE
MED.
CHERRY CK.
40° N
BUTTE
EGAN
SCHELL CREEK RANGE
SNAKE RANGE
50
ELY
6,50
39° N
6
93

NOTE ON SYSTEMATIC PALEONTOLOGY

The form used is fairly standard for fusulinid descriptions. I tried to stress criteria which were useful in identification of individual species and minimize those items which were nondiagnostic. Some of the species described are not pictured because the specimens studied did not lend themselves to useful and informative illustration.

Most of the identifications are based on comparisons of my material with illustrations in Knight, 1956, Slade, 1961, and Verville, Thompson, & Lokke, 1956.

Family FUSULINIDAE, von Moller, 1878

Subfamily FUSULININAE, Dunbar and Henbest, 1930

Genus PSEUDOFUSULINELLA, Thompson, 1951

Pseudofusulinella occidentalis, Thompson and Wheeler,

Plate 1, fig. 1,2

Neofusulinella occidentalis, Thompson and Wheeler, 1946, Geol. Soc. Amer. Mem. 17, pp. 25-26, plate 2, figs. 1-4.

Pseudofusulinella occidentalis, Thompson, 1951, Cushman, Found. Faram. Research, Contrib., v.2, p. 117, plate 14, figs. 6-11.

Shell small, inflated fusiform, with extended poles, inflated centers and concave lateral slopes. For shells of five volution, half lengths of 1.85 mm. and radius vector of .75 mm. were obtained for an average, giving a form ratio of 2.46. Early volution are ellipsoidal, later volutions are extended poleward and inflated centrally. Form ratios for first to fifth volutions are 1.61, 1.66, 1.72, 2.23, and 2.10.

Proloculus small, averaging 115 microns, (outside diameter). Spirotheca is composed of tectum and clear layer. Average thicknesses for the first to fifth volution ar 38, 49, 68, 81, and 84 microns. Septae fluted toward poles and flatten outward.

Two samples vore this species, 490 ft. at Ferguson Mountain and 1920 ft. at Nine Mile Canyon, of lower Wolfcampian age.

Pseudofusulinella utahensis Thompson & Bissell

(no illustration)

Pseudofusulinella utahensis Thompson & Bissell, 1954, Univ. Kansas Paleont. Contrib. Protozoa, Art. 5, Pp. 35-36, pl. 7, figs. 1-10.

Shell moderate, fusiform, inflated centrally with broadly rounded poles. One shell of six volutions had a half length of 2.86 mm. and a radius vector of 1.03 mm. giving a form ratio of 2.77. Early volutions ellipsoidal becoming inflated outward. Average form ratios for first to sixth volution are 1.46, 1.98, 2.23, 2.48, 2.79 and 2.63.

Proloculus large with outside diameter of 220 microns. Spirotheca thin, composed of a tectum and inner layer, thickness of spirotheca for the first to sixth volutions are 42, 47, 52, 57, 94, and 105 microns. Septae fluted at poles becoming less fluted inward.

Tunnel narrow, average angles for the first to sixth volution are 9, 14, 18, 28, 32 and 44 degrees.Chomata massive and overhanging tunnel.

One sample was studied from 92 feet at Ferguson Mountain in the Virgilian part of the section.

Subfamily SCHWAGERININAE Dunbar & Henbest 1930

Genus TRITICITES Girty 1904

Triticites pygmaeus Dunbar & Condra

Plate I fig. 3,4

Triticites cullomensis var. pygmaeus, Dunbar & Condra, 1928, Nebraska Geol. Surv., Bull. 2, Ser. 2, Pp. 95,96, pl. 5, figs. 3,4

Triticites pygmaeus, Dunbar & Skinner, 1937, Univ. Texas, Bull. 3701, pp. 614-616, pl. 48, figs. 13-26.

Shell small, inflated fusiform with gently sloping sides and broadly rounded poles. The axis of coiling curves slightly. Shells of five to six volutions give half lengths ranging from 1.31 to 2.78 mm. averaging 1.97 mm. and radius vectors ranging from .54 to 1.31 mm. averaging .82mm. giving an average form ratio of 2.15. Average form ratios from first to sixth volutions are 1.75, 1.95, 2.18, 2.20, 2.31 and 2.77.

Proloculus small, averaging 1.66 microns outside diameter. Spirotheca composed of tectum and alveolar keriotheca. Average thicknesses for the first to sixth volution are 27, 35, 45, 55, 65 and 78 microns. Septae mostly unfluted with some fluting in the polar regions.

Tunnel moderate, average tennel angles for the first to sixth volution are 20, 23, 25, 29, 30 and 27 degrees. Chomata well developed extending 1/3 of the way into each chamber.

Early chomata overhang the tunnel slightly.

Samples containing this species occur an 92 and 147 feet at Ferguson Mountain; 1048, 1105 and 1245 feet at Nine Mile Canyon and 1 foot north of the Schell Creek Range. It occurs in the Virgilian part of each section.

Triticites cullomensis Dunbar & Condra

Plate I figs. 5,6

Triticites cullomensis Dunbar & Condra, 1928, Nebraska Geol. Surv. Bull. 2, 2nd Ser., pp. 93-95, pl. 5, figs. 6,7,9; White 1932, Univ. Texas Bull. 3211, pp. 43,44, pl. 3, figs. 1-3: Dunbar & Henbest, 1942, Illinois Geol. Surv. Bull. 67, pp. 135, 136, pl. 23, figs. 13-18; Thompson, Verville, & Bissell, 1950, Jour. Paleon., v. 24, no. 4, pp. 457-460, pl. 63, figs. 1-3.

Shell medium, inflated fusiform lateral sides slope steeply to bluntly rounded poles. Half lengths range from 1.95 to 3.07 mm. averaging 2.58 mm. for specimens of six to seven volutions, half widths range from .76 to 1.48 mm. giving an average of 1.20 mm. Average form ratio for the shell is 2.21 and for the first to seventh volution they are 1.63, 1.93, 2.11, 2.04, 1.92, 2.24 and 2.02.

Proloculus medium averaging 1.62 microns and slightly oval shaped. Spirotheca contains tectum and alveolar keriotheca. Average wall thicknesses for the first to seventh volutions

are 30, 35, 49, 57, 68, 85, 88 and 79 microns. Septae moderately fluted at poles becoming less intense toward the center.

Tunnel moderate, average angles for the first to seventh volutions are 20, 20, 21, 26, 31, 36 and 21 degrees. Chomata well developed and massive, occasionally they will overhang the tunnel generally in the early volutions.

Specimens studied came from 370 feet north of the Schell Creek Range, at 192, 461, and 490 feet at Ferguson Mountain, and at 1710 feet at Nine Mile Canyon. They are of lower Wolfcampian age and are useful in determining the base of the Wolfcampian age rocks there.

Triticites hobblensis Thompson Verville & Bissell

Plate 2 figs. 1,2

Triticites hobblensis Thompson, Verville & Bissell, 1950, Jour. Paleontology, v. 24, no. 4, p. 460-462, pl. 63, figs. 4-15, pl. 64, figs. 1-3.

Shell moderate, elliptically shaped, lateral slopes curve to broadly rounded poles. Axis of coiling fairly straight. Halflengths range from 1.67 to 2.60 mm. averaging 2.16mm., halfwidths range from .74 to 1.31 mm. giving an average form ratio of 2.00 for shells of six volutions. Average form ratios for the first to sixth volution are 1.66, 1.38, 1.77, 1.64, 2.23, and 1.97.

Proloculus moderate, averaging 1.91 microns Spirotheca of tectum and alveolar keriotheca is thick, averaging, for the

first to sixth volution, 34, 46, 62, 67, 104, and 103 microns. Septae fluted only along axial trace.

Tunnel moderate, average angles for the first to sixth volutions are 28, 22, 23, 28, 36, and 30 degrees. Chomata moderately developed with sides that slope gently into tunnel.

Specimens were found at 192, 331, 461, and 490 feet at Ferguson Mountain and at 1710 feet at Nine Mile Canyon.

Triticites ventricosus (Meek & Hayden)

Plate 2 figs. 3,4

Fusulina cylindrica var. venticosa Meek & Hayden, 1858, Acad. Nat. Sci. Philadelphia, Proc. v. 10, p. 261.

Fusulina cylindrica Meek & Hayden, 1865, Smithson. Contrib. Knowledge, v. 14, p. 14-15, pl.1, figs. 6a-6i (Figs. 6d-6g referred to as var. ventricosa).

Fusulina ventricosa Moller, 1879, Acad. Imp Sci. St. Petersburg Mem., VIIe ser., tome 27, no. 5, Pp. 4-6.

Girtyina ventricosa Staff, 1909, Neues Jahr. Beil., bd. 27, p. 506.

Triticites ventricosa Dunbar & Condra, 1928, Nebraska Geol. Surv. Bull. 2, 2nd ser., pp. 84-91, pl. 3, figs. 2,4,6?; pl.4, figs.1?, 3, 6; pl. 9, fig. 8.

Triticites rothi Skinner, 1931, Jour. Paleontology, v.5, pp. 19-20, pl. 3, figs. 1-3.

Shell moderate, rhomboidal to fusiform, lateral slopes curve gently to bluntly pointed poles with straight axis of coiling. Halflengths range from 2.30 to 3.80 mm. averaging 2.99 mm. halfwidths range from .72 to 1.25 mm. averaging .96 mm. giving form ratios of 2.94 and form ratios for the first to sixth volutions of 2.41, 2.22, 2.74, 2.76, 2.82, and 3.00.

Proloculus small, ranging 110 to 167 and averaging 144 microns. Spirotheca of tectum and thick alveolar keriotheca, average for the first to sixth volution 34, 51, 66, 79, 101, and 93 microns. Septae fluted irregularly and moderately intense along axial lines.

Tunnel moderate, expanding regularly between moderately developed chomata which appear as rounded knobs. Average tunnel angles for the first to sixth volution are 28, 24, 25, 29, 33, and 35 degrees.

Specimens were found at 331 feet at Ferguson Mountain and 1710 feet at Nine Mile Canyon in the lower Wolfcampian section.

Triticites meeki (Möller)

Plate 2 fig. 5

Fusulina cylindrica var. ventricosa Meek & Hayden 1858, Acad. Nat. Sci Philadelphia, Proc., 1858, v. 10, p. 261

Fusulina cylindrica Meek & Hayden, 1865, Smithson. Contib. Knowledge, v. 14, p. 14-15, pl. 1, fig. 6a, (Not fig. 6d-

6g, referred to by Meek & Hayden as var. ventricosa).
Fusulina ventricosa var. meeki Moller, 1879, Acad. Imp. Sci. St. Petersburg, Mem. VIIe ser. tome 27, no. 5, pp. 4-6.
Triticites ventricosus Dunbar & Condra, 1928, Nebraska Geol. Surv. Bull. 2, 2nd Ser., pp. 84-91, pl. 1, fig. 2; (?)pl. 3, fig. 1; pl. 4, fig. 4.

Shell large, elongate fusiform, concave lateral slopes terminate in bluntly pointed poles. Ranges of halflengths vary from 5.63 to 2.71 mm. averaging 3.71 mm. for halfwidths the range is from 1.39 to .83 and the average is 1.16 mm. for specimens of six volutions. Volutions expand regularly. Average form ratio for shell is 3.03 and for the first six volutions 1.99, 2.03, 2.75, 2.98, 3.06 and 3.66.

Proloculus large and elliptical ranging from 216 to 3.14 microns and averaging 264 microns. Spirotheca thick with measurements for the first six volutions of 33, 35, 48, 57, 66, and 74 microns. Septae irregular and moderately fluted along axis of coiling.

Tunnel narrow and expanding evenly, average tunnel angles for the first six volutions are 15, 13, 19, 22, 22, and 23 degrees. Chomata well developed some overhang the tunnel but that is not the rule. Chomata rise $\frac{1}{2}$ into the chamber.

Specimens were found at 370, 650 and 670 feet north

of the Schell Creek Range and at 461 feet at Ferguson Mountain and they are of Lower Wolfcampian age.

Triticites cellamagnus Thompson & Bissell

Plate 3 fig. 1

Triticites cellamagnus Thompson & Bissell, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 43-44, pl. 10, figs. 14-17, pl. 11, figs. 1-12.

Shell medium, elliptical to fusiform, lateral slopes concave to bluntly pointed poles. Halflengths for shells of five to six volution range from 1.53 to 3.06 averaging 2.26 mm. and halfwidths ranging from .71 to 2.08 averaging 1.16 mm. giving form ratios averaging 2.03. Form ratios for the first to sixth volutions are 1.65, 1.93, 1.58, 2.12, 1.82 and 2.46.

Proloculus very large ranging from 470 to 280 microns averaging 360 microns. Proloculus elliptical ranging up to 50 microns difference in diameter. Spirotheca composed of tectum and very thick alveolar keriotheca, wall thicknesses for the first to sixth volutions are 48, 62, 67, 77, 97 and 121 microns. Septae fluted moderately throughout most of the shell.

Tunnel moderate, expanding evenly, average tunnel angles for the first six volutions are 19, 20, 21, 20, 23, and 20 degrees. Chomata well developed rising nearly to the top of the chamber in a triangular shape.

Specimens of this species were found at 370 feet north of the Schell Creek Range, at 331 feet at Ferguson Mountain, and at 425 feet at Spruce Mountain in the lower Wolfcampian section.

Triticites creekensis Thompson

Plate 3 figs. 2,3

Triticites creekensis Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 42-43, pl. 9, figs. 22-26, pl. 10, figs. 1-13.

Shells large, inflated fusiform, lateral slopes curve gently to broadly rounded poles. Halflengths for shell of six volutions range from 2.81 to 3.61 mm. averaging 3.17 mm. and halfwidths ranging from 1.50 to 1.68 mm. averaging 1.57 mm. giving a form ratio of 1.99. Average form ratios for the first six volutions are 1.60, 1.43, 2.25, 2.38, 2.00 and 2.70.

Proloculus moderate averaging 179 microns outside diameter. Spirotheca of tectum and alveolar keriotheca is moderate in size, average wall thicknesses for the first six volutions ar 36, 38, 51, 71, 80 and 84 microns. Septae moderately fluted along axis of coiling becoming less fluted away from it.

Tunnel moderate, average angles for the first six

volutions are 31, 29, 30, 34, 41 and 25 degrees. Chomata moderately well developed, however in some specimens chomata were missing or poorly developed usually in the outer volutions.

Four specimens were found from 1440 feet at Nine Mile Canyon and are of lower Wolfcampian age.

Genus DUNBARINELLA Thompson, 1932

Dunbarinella wetherensis Thompson

plate 3 fig. 4

Dunbarinella wetherensis Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 49-50, pl. 23, figs. 5-14.

Shell medium sized, inflated fusiform to rhomboidal, lateral slopes go to broadly rounded poles without much curvature. Halflengths range from 2.23 to 3.65 mm. averaging 2.94 mm., halfwidths range from .66 to 1.46 mm. averaging 1.07 mm. giving an average form ratio of 2.86. Average form ratios for the first six volutions are 1.32, 1.35, 3.57, 3.22, 2.89 and 2.22.

Proloculus moderate, averaging 2.02 microns outside diameter. Spirotheca is composed of tectum and moderately thick keriotheca, wall thicknesses average, for the first six volutions, 56, 70, 86, 96, 127 and 142 microns. Fluting very irregular and moderately intense.

Tunnel moderate and poorly defined, average tunnel angles for the first six volutions are 29, 23, 29, 33, 40, and 23 degrees. Chomata weak and missing in some outer volutions.

Specimens were found from two localities, 560 feet at the television tower in the northern Pequop Mountains and 370 feet north of the Schell Creek Range of lower to middle Wolfcampian age.

Genus PSEUDOSCHWAGERINA Dunbar & Skinner, 1936

Pseudoschwagerina needhami Thompson

Plate 4 figs. 1,2

Pseudoschwagerina needhami Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 72-73, pl. 47, figs. 7-8,11,17.

Shell moderate, inflated fusiform, lateral slopes are convex to the broadly rounded poles. Halflengths range from 2.19 to 3.64 mm. averaging 2.86 mm. and halfwidths ranging from 1.24 to 2.30 mm. averaging 1.58 mm. giving an average form ratio of 1.86. Average form ratios for the first six volutions are 1.05, 1.25, 1.67, 1.95, 1.77, and 1.52.

Proloculus moderately large, averaging 207 microns. Spirotheca composed of tectum and alveolar keriotheca is moderately thick, average thicknesses for the first to sixth volutions are 20, 49, 53, 75, 96, and 111 microns. Septae irregularly fluted near poles becoming more regular toward the center.

Tunnel moderate in size and expands slightly irregularly,

average tunnel angles for the first five volutions are 23, 20, 20, 27, and 22 degrees. Chomata weakly developed and absent in the sixth volution.

Specimens were found at 841 feet at Ferguson Mountain and are of middle Wolfcampian age.

Pseudoschwagerina arta Thompson & Hazzard

Plate 4 fig. 3

Pseudoschwagerina arta Thompson & Hazzard, 1946, Geol. Soc. Amer. Mem. 17, p. 49, pl. 18, figs 1-3.

Shell large, extremely inflated fusiform, lateral slopes are convex curving gently to pointed poles. Axis of coiling is straight. Halflengths range from 3.43 to 5.70 mm. averaging 4.85 mm. and halfwidths range from 2.32 to 3.13 mm.averaging 2.64 mm. for specimens of five volutions giving an average form ratio of 1.89. Average form ratios for the first to fifth volutions are 1.74, 1.91, 1.76, 1.59, and 2.06.

Proloculus moderately large ranging from 340 to 454 microns and averaging 415 microns. Spirotheca moderately thick composed of tectum and alveolar keriotheca. Average thicknesses for the first five volutions are 56, 83, 88, 93, and 107 microns. First two or three volutions are rather closely wound becoming greatly inflated in the outer volutions. Septae are very thin and unfluted in all specimens.

Tunnel is straight, chomata developed only on the first three volutions and rather poorly developed. Average tunnel angles for the first three volutions are 36, 25, and 39 degrees.

Examples of this species were found at 685 and 836 feet at Spruce Mountain and at 1045 feet at Ferguson Mountain. It ranges from middle to upper Wolfcampian in age.

Pseudoschwagerina convexa Thompson

Plate 4 fig. 4

Pseudoschwagerina convexa Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 75-76, pl. 44, figs. 1-4, pl. 51 figs 1-8.

Shell large, inflated fusiform, lateral slopes curve steeply to broadly rounded poles. Halflengths range from 5.40 mm. to 4.93mm. averaging 5.10 mm. halfwidths ranging from 1.18 to 2.34 mm. averaging 1.83 mm. giving an average form ratio of 2.54 for specimens of five volutions. Average form ratios for the first five volutions are 2.61, 2.35, 3.06, 2.72 and 2.28.

Proloculus large, averaging 370 microns outside diameter. Spirotheca of tectum and alveolar keriotheca moderately thick, alveoli rough and irregular. Average wall thicknesses for first five volutions are 67, 82, 70, 110, and 100 microns. Septae relatively unfluted and thin. Chomata not developed in these specimens.

One sample containing this species was a random sample taken

above the Lone Butte-Riepe Spring section and are of middle Wolfcampian age.

Pseudoschwagerina texana Dunbar & Skinner

Plate 5 fig. 1

Schwagerina fusulinoides Beede & Kniker, 1924, Univ. Texas Bull. 2433, p.19-23, pl.1, fig.4; pl.7, figs. 1-3 (not pl. 3, figs. 1-3, 8); Dunbar & Condra, 1928, Nebraska Geol Surv. Bull.2, 2nd ser., p. 121-123, pl. 14, figs 2-5; White, 1932, Univ. Texas Bull. 3211, p. 81-82, pl. 8, figs. 1-12.

Pseudoschwagerina fusulinoides Needham, 1937, New Mexico School Mines Bull. 14, p. 51-53, pl. 8, fig. 11; pl. 9, figs. 1-12.

Pseudoschwagerina texana Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, p. 662-665, pl. 52, figs 1-8, pl. 53, fig. 9.

Shell large, elongate fusiform, lateral slopes concave to broadly rounded poles with a nearly straight axis of coiling. Halflengths range from 4.48 to 5.10 mm. averaging 4.77 mm. half-widths range from 1.74 to 2.48 mm. averaging 2.05mm. giving an average form ratio of 2.36 for shells of five volutions. Average form ratios for the first to fifth volutions are 2.36, 2.40, 2.07, 3.04, and 2.10.

Proloculus large, averaging 3.07 microns. Spirotheca moderately thick, wall thicknesses for the first five volutions are 47, 76, 87, 111, and 129 microns. Septae irregularly fluted

only in extreme polar regions and around the proloculus.

Tunnel straight surrounded by poorly developed chomata which are nonexistent in outer volutions. Tunnel angles were too variant to be statistically meaningful.

Specimens were found in samples from 254 feet from Brush Creek in the southern Pequop Mountains and a random sample from above the Lone Butte-Riepe Spring section and are of middle Wolfcampian age.

Pseudoschwagerina morsei Needham
No illustration

Pseudoschwagerina morsei Needham, 1937, New Mexico School Mines Bull. 14, p. 54-56, pl.X, figs. 5-7; pl.XI, figs.1-4.

Shell moderate, slightly inflated fusiform, lateral slopes curve slightly convex to bluntly pointed poles. Halflengths range from 3.94 to 4.15 mm. averaging 4.04 mm. halfwidths range from 2.07 to 2.19 mm. averaging 1.90 for shells of seven volutions. Average form ratios for the first seven volutions are 1.00, 1.25, 1.49, 1.54, 1.79, 2.41, and 2.69.

Proloculus moderate with outside diameter of 199 microns. Spirotheca thin, average wall thicknesses for the first seven volutions are 21, 26, 42, 53, 68, 104, and 105 microns. Septae thin and regularly fluted, fluting intense in polar regions becoming less intense centrally. Tunnel ill-defined due to poorly developed chomata.

Specimens were found at 841 feet at Ferguson Mountain and are of upper Wolfcampian age.

Pseudoschwagerina uber Thompson & Hazzard

Plate 5 figs. 2,3

Pseudoschwagerina uber, Thompson & Hazzard, 1946, Geol. Soc. Amer. Mem. 17, p. 48, pl. 14, figs. 10,11, pl. 17, figs. 1-3.

Shell moderate lateral slopes slightly concave go to bluntly pointed poles. The axis of coiling is straight. Halflengths range from 2.34 to 3.64 mm. averaging 2.93 mm. halfwidths range from 1.06 to 1.75 mm. averaging 1.31 mm. giving an average form ratio of 2.25. Average form ratios for the first six volutions are 2.28, 2.41, 2.74, 2.83, 3.06, and 2.79.

Proloculus small ranging from 138 to 184 microns averaging 157 microns outside diameter. Spirotheca thin with coarse alveoli average wall thicknesses for the first to sixth volutions are 24, 38, 49, 65, 80, and 87 microns. Septae regularly fluted along axis of coiling.

Tunnel expands regularly between weakly developed chomata average tunnel angles for the first to fifth volutions are 20, 22, 26, 27, and 46 degrees.

Specimens were found at the sample from 841 feet at Ferguson Mountain of upper Wolfcampian age.

Pseudoschwagerina beedi Dunbar & Skinner

No illustration

Pseudoschwagerina beedi Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, p. 656-658, pl. 49, figs. 1-14.

Shell moderately large, inflated fusiform, lateral slopes slightly convex going to pointed poles with straight axis of coiling. Halflengths range from 3.46 to 3.09 mm. averaging 3.28 mm. Halfwidths range from 1.58 to 1.75 mm. averaging 1.66 mm. giving a form ratio of 1.97 for five volutions. Average form ratios for the first five volutions are 1.22, 1.38, 1.57, 1.71, and 1.95.

Proloculus large averaging 344 microns. Spirotheca moderate, wall thicknesses for the first five volutions are 42, 57, 63, 105, and 106 microns. First two or three volutions expand evenly, later ones are inflated. Septae thin and fluted along axis of coiling. Tunnel pooly defined and chomata nearly nonexixtent.

One specimen was found in a randon sample taken at Lone Butte-Riepe Spring section and is of upper Wolfcampian age.

Genus SCHWAGERINA Moller, 1877

Schwagerina providens Thompson & Hazzard
No illustration

Schwagerina providens Thompson & Hazzard, 1946, Geol. Soc. Amer. Mem. 17, p. 43-44, pl. 14, figs. 1-9.

Shell moderate, fusiform, lateral slopes slightly convex curving to pointed poles with straight axis of coiling. Shells of four volutions yield halflengths ranging from 2.96 to 3.55 mm. averaging 2.78 mm., halfwidths ranging from .90 to 1.18 mm. averaging 1.03 mm. giving form ratios ranging from 2.51 to 3.95 averaging 3.24. Average form ratios for the first to fourth volutions are 2.47, 2.89, 2.90, and 3.21.

Proloculus small, averaging 115 microns outside diameter. Spirotheca moderate, showing coarse alveoli. Average wall thicknesses for the first four volutions are 41, 52, 62, and 71 microns. Septae thin, fluted throughout but most intense along the axis of coiling. Juvenile volutions elliptical becoming more elongate in outer volutions.

Tunnels wide, average tunnel angles for the first four volutions are 37, 34, 43, and 30 degrees. Chomata well developed rising $\frac{1}{2}$ way into chambers. Chomata themselves thin and tall.

Specimens studied were found at 679 feet at Ferguson Mountain and at 400 feet at Lone Butte-Riepe Spring section and are of middle Wolfcampian age.

Schwagerina wellsensis Thompson & Hansen

Plate 5 fig. 4

Schwagerina wellsensis Thompson & Hansen, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 32, figs. 1-6, 7-9, pl.[34]

figs. 1-2.

Shell moderate, fusiform to elliptical, lateral slopes convex, poles broadly rounded and straight axis of coiling. Specimens of five volutions have halflengths ranging from 2.12 to 3.40 mm. averaging 3.05 mm. halfwidths ranging from .91 to 1.44 mm. averaging 1.10 mm. giving form ratios ranging from 2.30 to 3.43 averaging 2.79. Average form ratios for the first five volutions are 2.33, 2.58, 2.75, 2.85, and 2.81.

Proloculus moderately large, averaging 245 microns outside diameter. Spirotheca thin with coarse alveoli, average wall thicknesses for the first five volutions are 28, 41, 55, 69, and 85 microns. Septae thick, moderately intense regular fluting throughout shell. Volutions expand regularly and remain constant shape throughout.

Tunnel moderate and slightly irregular, average tunnel angles for the first five volutions are 27, 25, 29, 33, and 37 degrees. Chomata poorly developed and irregular.

Specimens were found at 2115 and 2200 feet at Nine Mile Canyon, at 560 feet at the television tower north of Highway 40 in the Pequop Mountains, at 679 feet at Ferguson Mountain and at 1 foot in the southern Medicine Range-Riepe Spring section and it is of middle Wolfcampian age.

Schwagerina neolata Thompson

No illustration

Schwagerina neolata Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 65, pl. 36, figs. 9-15.

Shell medium-sized, inflated fusiform, lateral slopes convex, pointed poles, and straight axis of coiling. Half-lengths for shells of seven volutions range from 2.11 to 3.17 mm. averaging 2.69 mm. halfwidths range from 1.21 to 1.60 mm. averaging 1.39 mm. giving form ratios ranging from 1.74 to2.44 averaging 1.97. Average form ratios for the first seven volutions are 1.30, 1.49, 1.84, 1.89, 1.95, 2.36, and 2.10.

Proloculus small , averaging 149 microns. Spirotheca thick with coarse alveoli, average wall thicknesses for the first eight volutions are 29, 40, 45, 49, 58, 73, 84, and 99 microns. Volutions expand evenly and rapidly from center juvenile volutions ellipsoidal becoming more inflated in later volutions. Septae intensely fluted along axis of coiling becoming less intense away from the central regions.

Tunnel narrow and irregular, average tunnel angles for the first to sixth volutions are 16, 14, 22, 22, 23, and 28 degrees. Chomata weak and absent after the sixth volution. Axial filling present along coiling axis.

Specimens studied were found at 841 feet at Ferguson Mountain and are of middle Wolfcampian age.

Schwagerina campensis Thompson

Plate 6 fig. 1

Schwagerina campensis Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 57-58, pl. 28, figs. 1-15.

Shell large, elongate fusiform to subcylindrical, lateral slopes curve gently to blunt poles, axis of coiling straight. Halflengths for six volutions range from 3.14 to 5.30 mm averaging 4.51 mm. halfwidths range from .98 to 1.97 mm. giving form ratios ranging from 2.18 to 4.82 mm. averaging 3.56 mm. Average form ratios for the first six volutions are 1.60, 1.64, 2.17, 2.52, 2.98, and 2.47.

Proloculus moderate averaging 215 microns. Spirotheca thick, average wall thicknesses for the first six volutions are 51, 61, 70, 94, 116, and 89 microns, alveoli coarse. Early volutions elliptical, later ones elongate rapidly. Septae fluted throughout but most intensely toward the poles.

Tunnel moderate and poorly defined, average tunnel angles for the first six volutions are 19, 24, 28, 35, 34, and 47 degrees. Chomata poor, axial filling in some specimens near the central regions.

Specimens studied were found at 685 feet at Spruce Mountain, 679 and 680 feet at Ferguson Mountain and at 400 feet at Lone Butte-Riepe Spring section. This species is given a middle Wolfcampian age.

Schwagerina longissimoidea (Beede)

Plate 6 fig. 2

Fusulina longissimoidea Beede, 1916, Indiana Univ. Studies, v. 3, p. 13-14; Beede, 1924, Univ. Texas Bull. 2433, p. 80, pl. 1, fig. 10; Dunbar & Condra, 1928, Nebraska Geol. Surv. Bull. 2, 2nd ser., p. 114-116, pl. 10, figs. 4-9.

Triticites longissimoidea White, 1932, Univ. Texas Bull. 3211, p. 55-57.

Pseudofusulina longissimoidea Roth, 1931, Jour. Paleontology, v. 5, p. 295.

Schwagerina longissimoidea Dunbar & Skinner, 1936, Jour. Paleontology, v. 10, p. 90.

Shell large, elongate fusiform, lateral slopes nearly straight, poles sharply pointed, axis of coiling slightly curved. Halflengths for shells of six volutions range from 3.12 to 5.46 mm. averaging 4.21 mm. halfwidths range from .76 to 1.71 mm. averaging 1.01 mm. giving form ratios ranging from 2.74 to 4.17 mm. averaging 3.67. Average form ratios for the first six volutions are 2.24, 2.88, 3.20, 3.68, 3.71, and 3.65.

Proloculus moderately large averaging 266 microns, Spirotheca coarse and moderately thick, wall thicknesses average for the first six volutions are 40, 48, 53, 55, 70, and 75 microns. Septae fluted regularly and moderately intensely throughout shell. Juvenile volutions subspherical to ellipsoidal

rapidly becoming sharply elongate.

Tunnel wide, angles for the first six volutions average 23, 33, 29, 37, 39, and 60 degrees. Chomata weak to poor and very thin, some early chomata overhang tunnels.

Specimens were found at 560 feet at the television tower in the Pequop Mountains north of Highway 40, at 679 and 680 feet at Ferguson Mountain and 254 feet at Brush Creek and are given an age of middle Wolfcampian.

Schwagerina andresensis Thompson

Plate 6 fig. 3

Schwagerina andresensis Thompson, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 60, pl. 31, figs 1-16.

Shell large, fusiform, lateral slopes convex to concave near bluntly rounded poles axis of coiling curved. Halflengths range from 3.50 to 4.23 mm. averaging 3.92 mm. halfwidths range from .99 to 1.65 mm. averaging 1.30 mm. giving form ratios ranging from 2.39 to 3.75 averaging 2.81. Average form ratios for the first six volutions are 2.31, 2.55, 2.69, 2.92, 2.78, and 2.66.

Proloculus moderate, averaging 225 microns. Spirotheca thick and coarse, averaging 31, 45, 66, 75, 79, and 85 microns for the first six volutions. Young volutions nearly circular becoming elliptical to elongate elliptical in later volutions.

Septae fluted predominantly located along axial trace.

Tunnel broad and ill-defined, average tunnel angles for the first six volutions are 30, 26, 28, 35, 36, and 40 degrees. Chomata thin and overhanging in some specimens.

Specimens were found at 2115 and 2425 feet at Nine Mile Canyon and at 679 feet at Ferguson Mountain. It is of middle Wolfcampian age.

Schwagerina eolata Thompson

Plate 7 fig. 1

Schwagerina eolata Thompson, 1954, Univ. Kansas Paleont.Contrib. Protozoa, Art. 5, p. 64-65, figs. 1-8.

Shell moderately large, elongate fusiform to subcylindrical, bluntly pointed poles with nearly straight lateral slopes and straight axis of coiling. Halflengths for the first five volutions range from 3.12 to 4.96 mm. averaging 3.82 mm. halfwidths ranging from .74 ti 1.94 mm. average 1.38 mm. give form ratios ranging from 1.92 to 3.72 averaging 3.17. Average form ratios for the first to fifth volutions are 2.13, 2.84, 3.12, 3.20, and 3.10.

Proloculus moderately large, averaging 271 microns. Spirotheca thick with coarse alveoli, average wall thicknesses for the first to fifth volutions are 51, 83, 84, 84, and 94 microns. Early volutions are elongate elliptical becoming

elongate fusiform in outer volutions. Septae regularly fluted throughout most of shell.

Tunnel broad and absent after the fourth volution, average tunnel angles for the first four volutions are 34, 22, 30, and 41 degrees. Chomata poor. Axial filling heavy in most specimens.

Specimens were found at 2115 feet at Nine Mile Canyon, at 679 and 841 feet at Ferguson Mountain and 81 and 165 feet at Brush Creek. It is of middle Wolfcampian age.

Schwagerina bellula Thompson & Skinner

Plate 7 fig. 2

Schwagerina bellula Thompson & Skinner, 1937, Univ. Texas Bull. 3701, pl. 2, p. 643-644, pl. 63, figs. 8-18.

Shell small, fusiform to rhomboidal, lateral slopes nearly straight, axis of coiling slightly curved, and poles are bluntly rounded. Halflengths range from 2.32 to 3.86 mm. averaging 2.77 mm. halfwidths range from .82 to 1.27 mm. averaging 1.28 mm. giving form ratios ranging from 1.94 to2.60 averaging 2.46 for shell of five volutions. Average form ratios for the first five volutions are 1.76, 1.94, 2.01, 2.16, 2.44, and 2.41.

Proloculus small averaging 205 microns. Spirotheca thin, averaging for the first five volutions 25, 36, 44, 52, and 62

microns. Volutions expand regularly and evenly throughout. Septae regularly and highly fluted.

Tunnel indistinct, angles could not be taken accurately. Chomata poor or absent, when present chomata are low knobs.

This species was found at 193 and 201 feet at the Medicine Range, at 2820 feet at Brush Creek and at 38 feet at the southern Medicine Range-Pequop section. The age was found to be lower Leonardian.

Schwagerina dispansa Ross

Plate 7 fig. 3

Schwagerina dispansa Ross, 1959, Jour. Washington Acad. Sci., v. 49, no. 9, p. 304-305, pl. 2, figs. 7-12.

Shell moderate, fusiform to rhomboidal, lateral slopes show little curvature, poles sharply pointed and straight axis of coiling. Halflengths range from 2.95 to 4.23 averaging 3.54 mm. halfwidths range from 1.02 to 1.60 mm. averaging 1.29 mm. giving form ratios ranging from 2.43 to 3.60 averaging 2.56 for shells of six volutions. Average form ratios for the first six volutions are 1.93, 1.90, 2.08, 2.64, 2.45, and 2.47.

Proloculus moderate averaging 210 microns. Spirotheca moderate with rough alveoli, average wall thicknesses for the first five volutions are 31, 45, 62, 84, and 85 microns. Early volutions ellipsoidal expanding rapidly becoming inflated and

sharply pointed at the poles. Septae fluted very regularly and intensely. Tunnel too obscure to measure, chomata not present. Axial filling heavy especially at the poles.

Specimens were found at 704 feet at Spruce Mountain Ridge-Pequop section, and at 0 and 38 feet at the southern Medicine Range-Pequop section and is of basal Leonardian age.

Schwagerina guembeli Dunbar & Skinner

Plate 8 fig. 1

Schwagerina guembeli Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, p. 639-640, pl. 61, figs. 1-13.

Shell small, elongate fusiform to subcylindrical, lateral slopes convex, slightly curved axis of coiling. Halflengths for shells of five volutions range from 2.18 to 4.97 mm. averaging 3.40 mm. halfwidths range from .87 to 1.52 mm. averaging 1.16 mm. giving form ratios ranging from 2.11 to 3.92 averaging 3.18.

Proloculus moderate averaging 288 microns. Spirotheca thick with coarse alveoli, average wall thicknesses for the first five volutions are 42, 44, 49, 59, and 64 microns. Volutions expand regularly and slowly, all are elliptical in shape. Septae thin and fluting is moderate, predominantly in the polar regions. Axial filling present in the poles in outer volutions.

Specimens were found at 204 feet at the Medicine Range, at 704 feet at Spruce Mountain Ridge, and at 2140 feet at Ferguson Mountain and it is of lower Leonardian age.

Schwagerina crassitectora Dunbar & Skinner

Plate 8 fig. 2

Schwagerina crassitectora Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, p. 641-642, pl. 65, figs. 1-15.

Shell small, fusiform to elliptical, lateral slopes convex, poles bluntly rounded and axis of coiling straight. Halflengths for shell of five volutions range 1.96 to 4.80 mm. averaging 2.99 mm. halfwidths range from .52 to 1.71 mm. averaging 1.16 mm. giving form ratios ranging from 1.97 to 3.74 averaging 2.80. Average form ratios for the first five volutions are 2.39, 2.64, 3.00, 3.18, and 3.07.

Proloculus large, averaging 296 microns ranging from 204 to 365 microns. Spirotheca thick, and coarse, average wall thicknesses for the first five volutions are 34, 40, 61, 76, and 92 microns. Volutions expand evenly and are elongate elliptical to fusiform toward the outside volutions. Septae fluted intensely and evenly throughout the whole shell. Some light axial filling out to the third volution.

Specimens were found at 118, 186, 189, and 202 feet at the Medicine Range, at 61, 120, 795, 946, 1630, and 1563 feet

at Spruce Mountain Ridge-Pequop section, at 2140 feet at Ferguson Mountain, at 1655 and 1810 feet at Lone Butte-Pequop section and at 38 feet in the southern Medicine Range and it is of lower to middle Wolfcampian age.

Schwagerina youngquisti Thompson & Hansen

Plate 8 fig. 3

Schwagerina youngquisti Thompson & Hansen, 1954, Univ. Kansas Paleont. Contrib., Protozoa, Art. 5, p. 67-68, pl. 37, figs 6-11.

Shell large, elongate fusiform to rhomboidal, lateral slopes convex to slightly concave, straight axis of coiling. Halflength for one shell of six volutions is 3.62 mm. half-width is 1.72 mm. giving a form ratio of 2.16. Form ratios for the first six volutions are 1.74, 2.10, 2.12, 2.10, 2.19, and 2.07.

Proloculus extremely large, 476 microns outside diameter. Spirotheca moderately thick and coarsely alveolar, wall thicknesses for the first six volutions are 43, 48, 54, 65, 85, and 96 microns. Septae very intensely and regularly fluted, fluting extend the whole length of the shell. Early volutions are elliptical to subcylindrical becoming more elongate in outer volutions. Axial filling very heavy in most volutions.

One specimen was found at 1450 feet at Spruce Mountain Ridge-Pequop section, it is of lower Leonardian age.

Schwagerina franklinensis Dunbar & Skinner

Plate 9 fig. 1

Schwagerina franklinensis Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, p. 628-630, pl. 66, figs. 1-11.

Shell large, elongate fusiform, lateral slopes convex curving to blunt poles, axis of coiling straight. Halflengths range 4.94 to 3.54 mm. averaging 4.26 mm. halfwidths range from .73 to 1.54 mm. averaging 1.18 mm. giving form ratios averaging 3.77. Average form ratios for the first seven volutions 1.91, 2.21, 2.91, 3.26, 3.37, 3.59, and 3.79.

Proloculus medium sized, averaging 227 microns. Spirotheca thin with coarse alveoli, average wall thicknesses for the first to seventh volutions are 23, 36, 37, 69, 78, 70, and 88 microns. Early volutions elliptical becoming elongate elliptical rapidly. Septae thin, even, and intensely fluted throughout length of shell. Axial filling heavy in first few volutions, occasionally heavy in outer volutions.

Specimens were found at 117 feet at the Medicine Range, at 1563 feet at Spruce Mountain Ridge-Pequop section, and at 11 feet at the road cut on Highway 40 in the northern Pequop Mountains, it is of lower Leonardian age.

Genus PARAFUSULINA Dunbar & Skinner, 1931

Parafusulina linearis (Dunbar & Skinner)

Plate 9 fig. 2

Schwagerina linearis Dunbar & Skinner, 1937, Univ. Texas Bull. 3701, pt. 2, p. 637-638, pl. 62, figs. 12-15, pl. 63, figs. 1-7.

Shell long, narrow, elongate subcylindrical, lateral slopes convex curving to broadly rounded poles with straight axis of coiling. Halflengths range from 4.09 to 6.59 mm. averaging 5.68 mm. halfwidths range from .83 to 1.90 mm. averaging 1.35 mm. giving form ratios ranging from 3.16 to 5.49 averaging 4.38. Average form ratios for the first six volutions are 3.16, 3.43, 3.90, 4.27, 4.81, and 4.22.

Proloculus moderately large, averaging 233 microns outside diameter. Spirotheca thin and alveoli are coarse, average wall thicknesses for the first six volutions are 35, 43, 52, 65, 85, and 101 microns. Early volutions elliptical becoming elongate rapidly toward the outer volutions. Septae intensely fluted throughout length of shell. Axial filling heavy in central regions.

Specimens were found at 117 feet at the Medicine Range, at 2820 feet at Brush Creek in the southern Pequop Mountains, and at 10 feet. It is of basal Leonardian age and is useful in determining the base fo the Leonardian.

Parafusulina skaksgamensis crassimarginata Knight

Plate 9 fig. 3

Parafusulina shaksgamensis crassimarginata Knight, 1956, Jour. Paleontology, v. 30, no. 4, p. 787-788, pl. 87, figs. 1-3.

Shell large, elongate fusiform to subcylindrical, lateral slopes convex curving to bluntly pointed poles, with straight axis of coiling. Halflengths range from 3.08 to 5.10 mm. averaging 4.25 mm. halfwidths range from .98 to 1.60 mm. averaging 1.29 mm. giving an average form ratio for 3.35. Average form ratios for the first seven volutions are 2.19, 2.26, 2.50, 3.25, 3.36, 3.86, and 3.57.

Proloculus moderately large averaging 252 microns outside diameter. Spirotheca thin with coarse alveoli, average wall thicknesses for the first seven volutions elliptical, becoming elongate elliptical in outer volutions. Septae very intensely and regularly fluted throughout shell. Axial filling weak. Cuniculi well developed in central and outer volutions.

Specimens were found at 202, 238, and 249 feet at the Medicine Range, 2975, 3295, and 4200 feet at Brush Creek in the southern Pequop Mountains and 38 feet in the southern Medicine Range and is of lower Leonardian age.

Genus MONODIEXODINA

Monodiexodina sublinearis

no illustration

Monodiexodina sublinearis Sosnina M.I. 1956, Vsesouiuznyi Nauchno-Issledevatelskii Geol. Inst. (V.S.E.G.E.I.), Ministerstva Geol. i Okhr. Nedr SSR, nov. ser Paleontologiia, vol. 12.

Shell large, highly elongate fusiform, straight to convex lateral slopes, with straight axis of coiling. Halflengths for one specimen studied is 5.83 mm. halfwidth is .80 mm. giving a form ratio of 7.54. Average form ratios for the first five volutions are 4.60, 5.18, 5.99, 6.51, 7.28.

Proloculus could not be measured due to angle of cut. Spirotheca thin with coarse alveoli wall thicknesses are 36, 62, 52, 57, 93, and 88 microns. Early volutions elliptical elongating rapidly in outer volutions. Septae intensely fluted throughout shell. Axial filling very heavy obscuring walls in some volutions.

One sample contained specimens of this species at 1185 feet at Spruce Mountain Ridge-Riepe Spring section and is of upper Wolfcampian age.

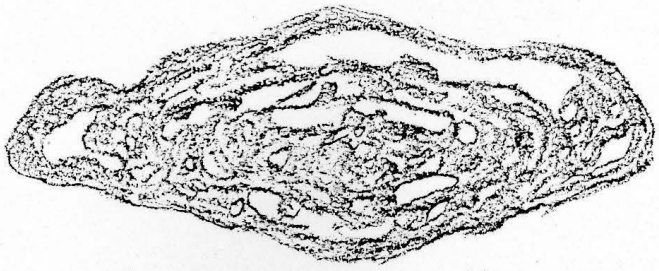


fig. 1

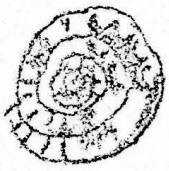


fig. 2

Pseudofusilinella occidentalis x 25

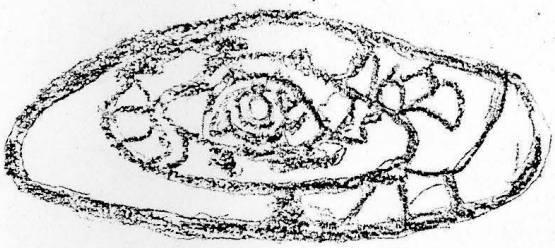


fig. 3

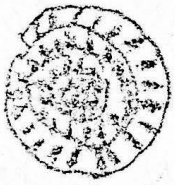


fig. 4

Triticites pygmaeus x 25

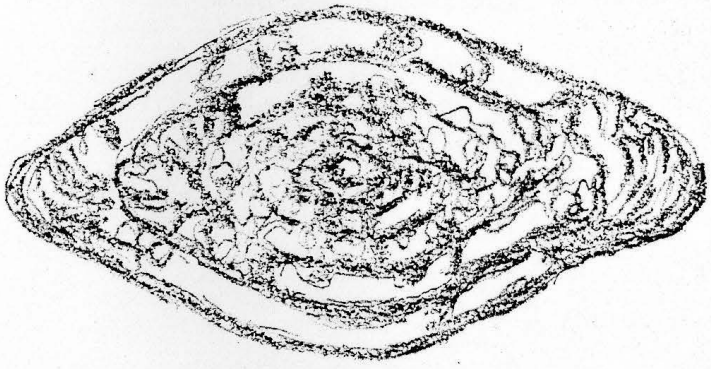


fig. 5

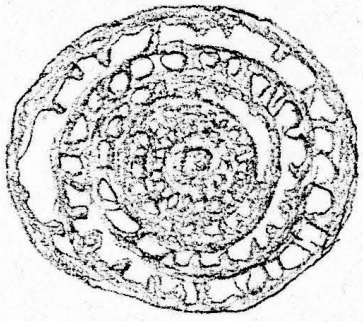


fig. 6

Triticites cullomensis x 25

PLATE 1

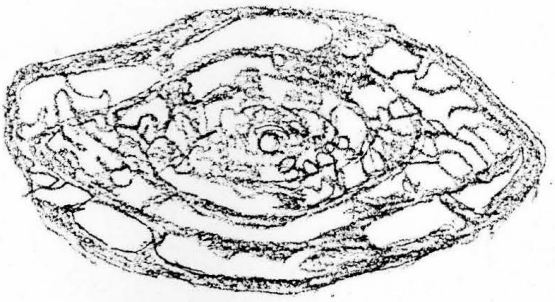


fig. 1

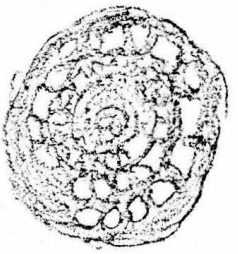


fig. 2

Triticites hobblensis x 25

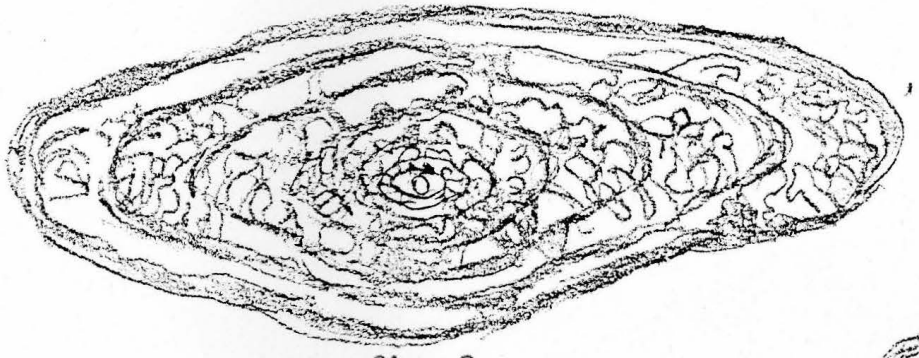


fig. 3

Triticites ventricosus x 25

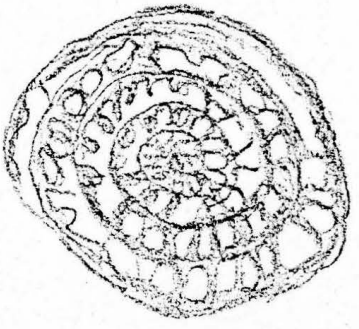


fig. 4

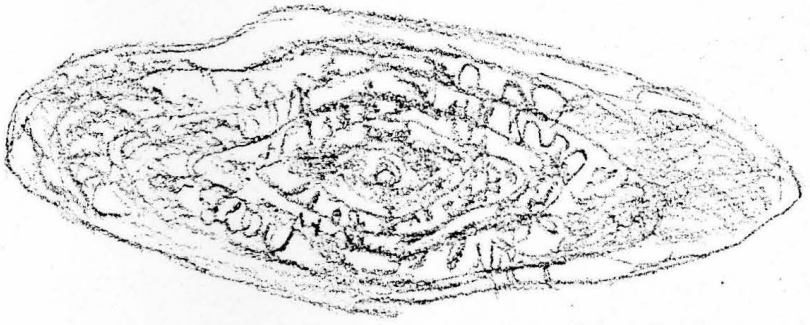


fig. 5

Triticites meeki x 25

PLATE 2

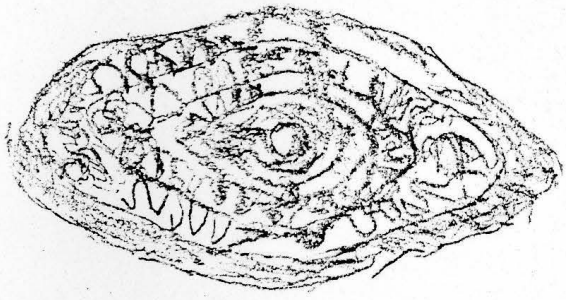


fig. 1

Triticites cellamagnus x 25

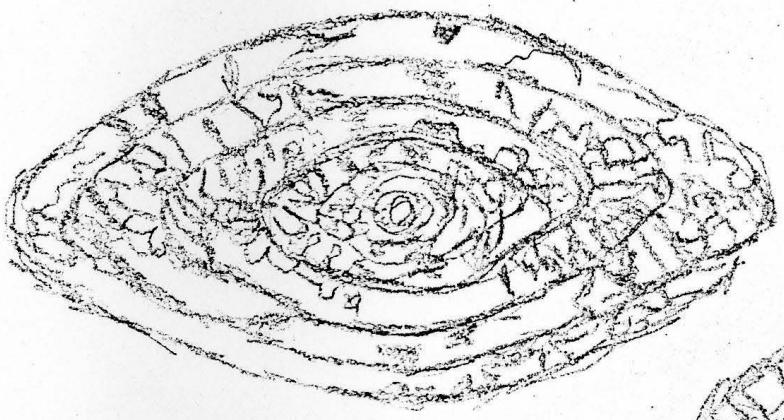


fig. 2

Triticites creekensis x 25

fig. 3

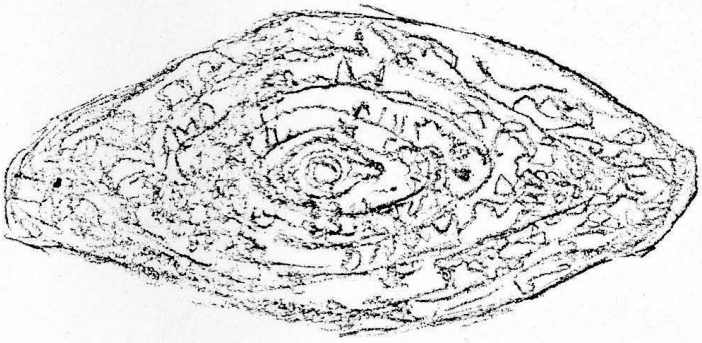


fig. 4

Dunbarinella wetherensis x 25

PLATE 3

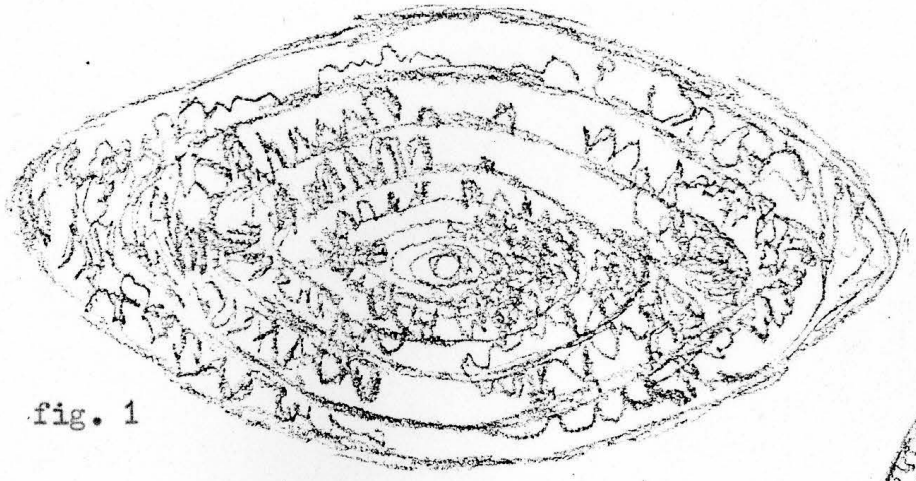


fig. 1

Pseudoschwagerina needhami x 25

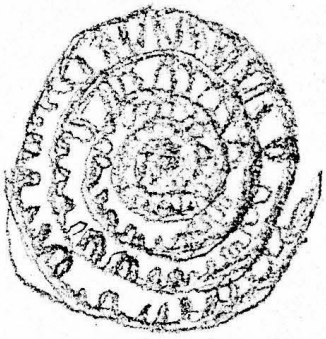


fig. 2

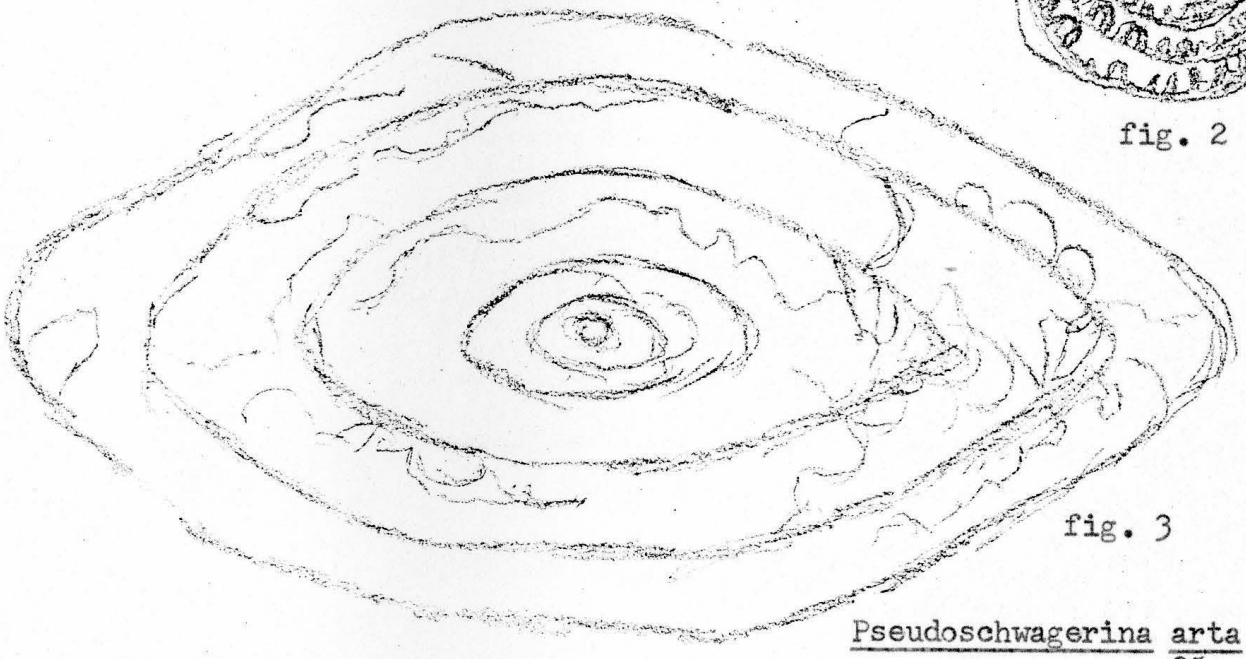


fig. 3

Pseudoschwagerina arta x 25

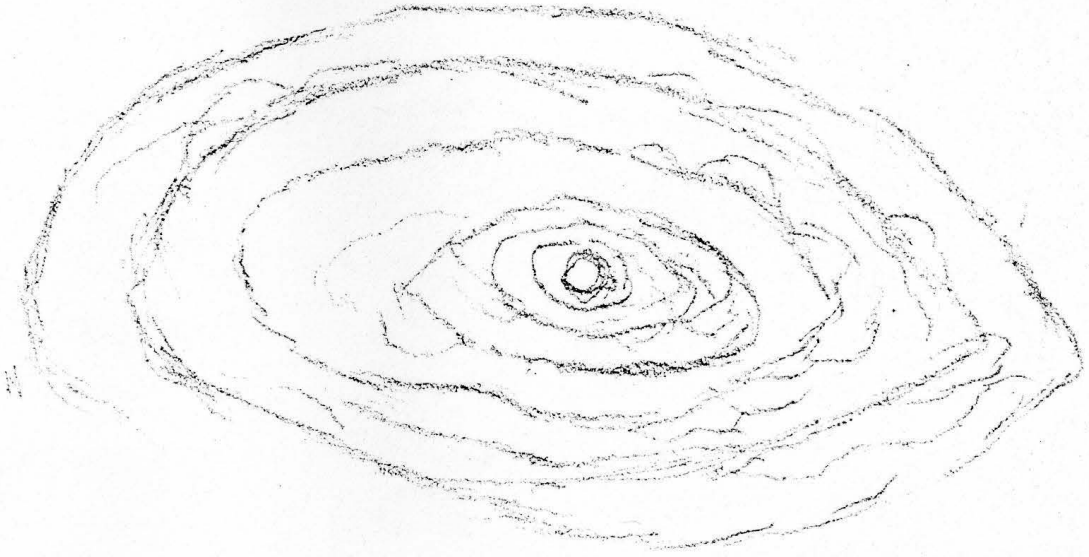


fig. 4 Pseudoschwagerina convexa x 25

PLATE 4

fig. 1

Pseudoschwagerina texana x 25

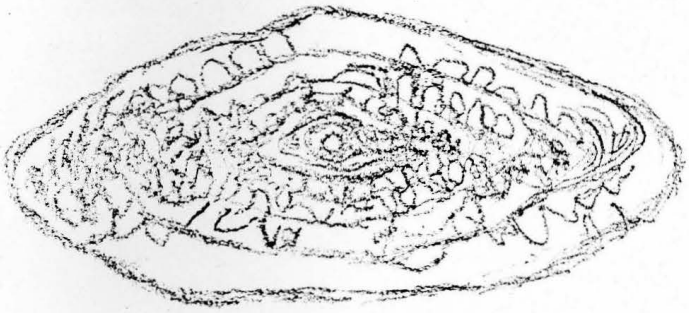


fig. 2

Pseudoschwagerina uber x 25

fig. 3

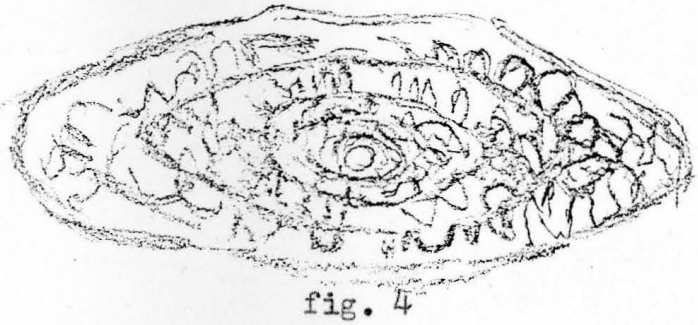


fig. 4

Schwagerina wellsensis x 25

PLATE 5

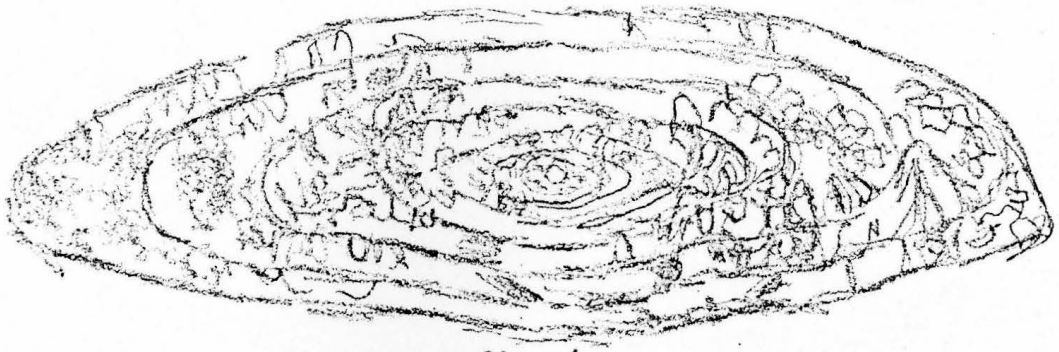


fig. 1

Schwagerina campensis x 25

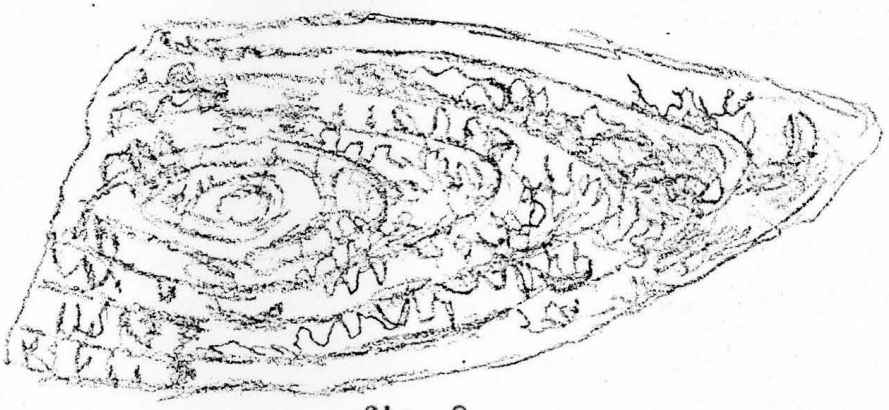


fig. 2

Schwagerina longissimoidea x 25

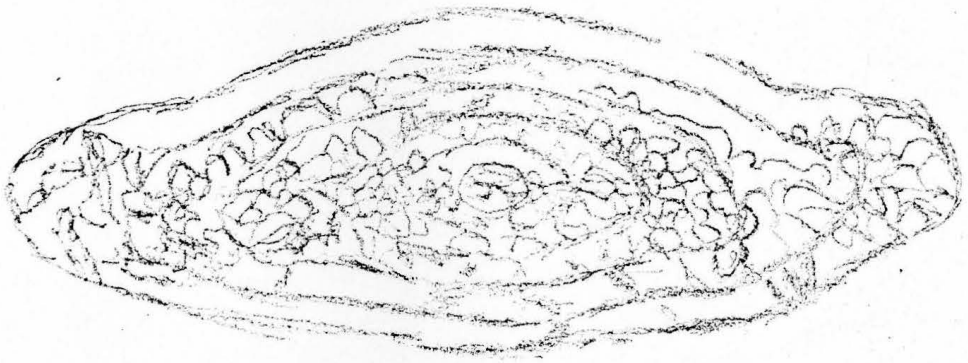


fig. 3

Schwagerina andrensis x 25

PLATE 6

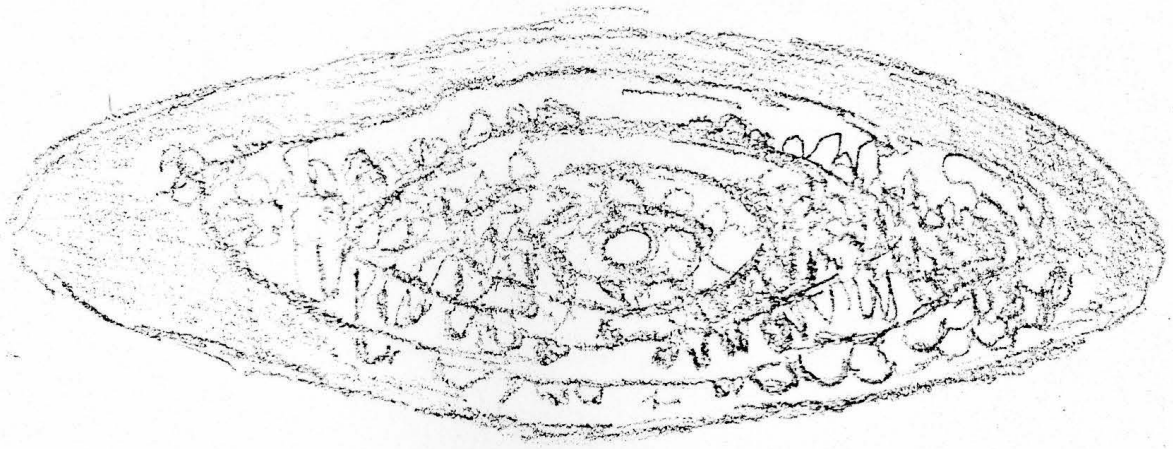


fig. 1

Schwagerina eolata x 25

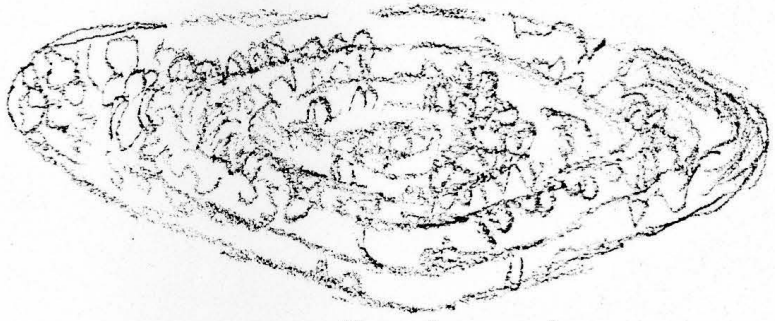


fig. 2

Schwagerina bellula x 25

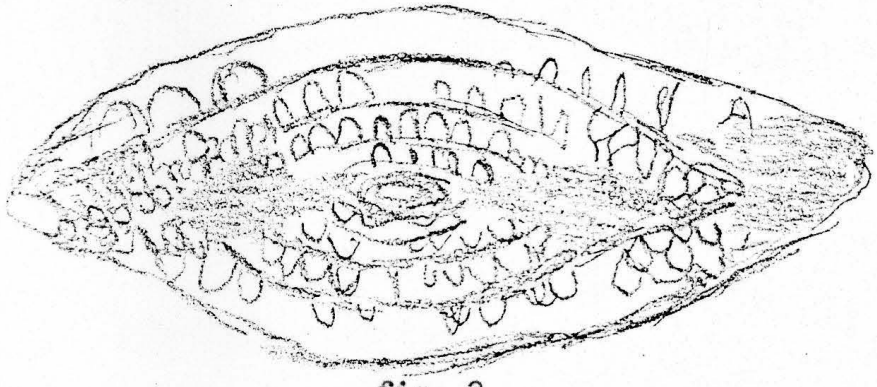


fig. 3

Schwagerina dispansa x 25

PLATE 7

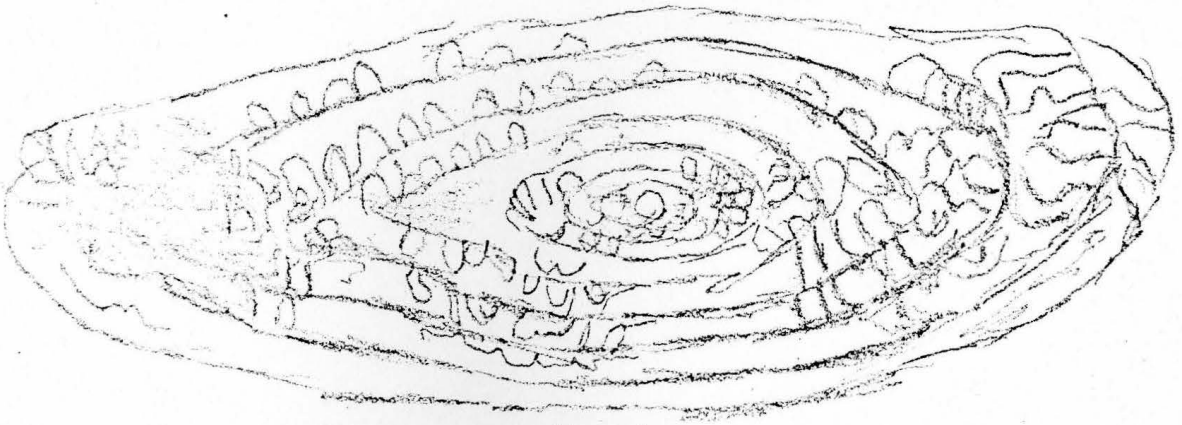


fig. 1

Schwagerina guembeli x 25

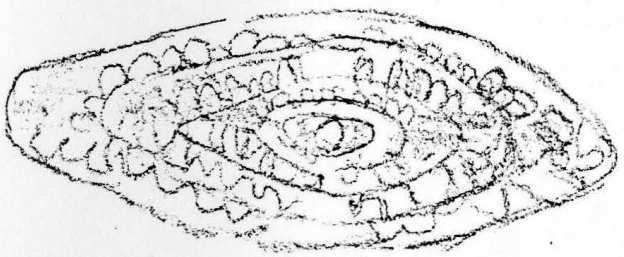


fig. 2

Schwagerina crassitectora x 25

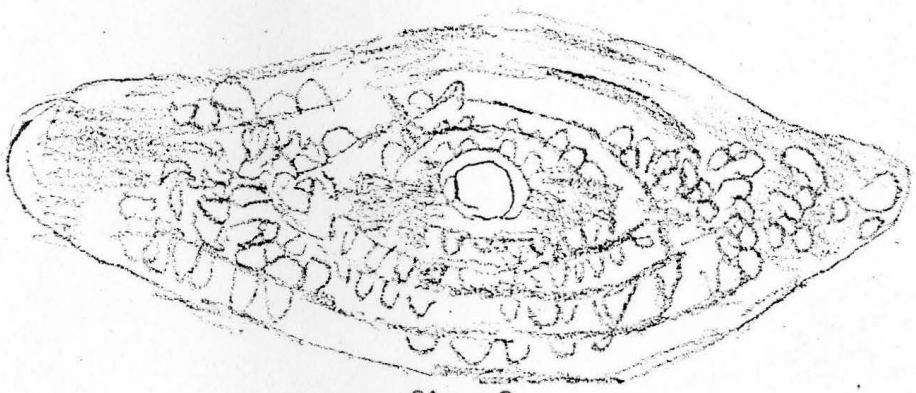


fig. 3

Schwagerina youngquisti x 25

PLATE 8

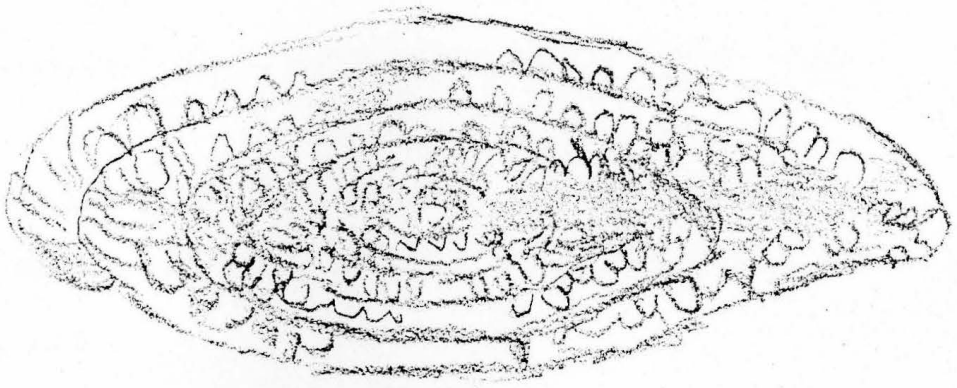


fig. 1

Schwagerina franklinensis x 25

fig. 2

Parafusulina linearis x 25

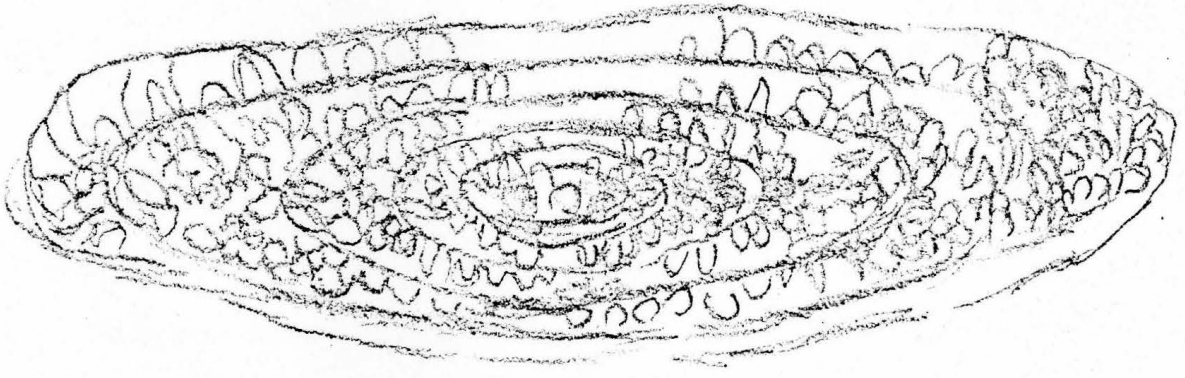


fig. 3

Parafusulina shaksgamensis crassimarginata x 25

PLATE 9

DESCRIPTION OF LOCATION OF STRATIGRAPHIC SECTIONS

1. Medicine Range, Elko Co., Sec. 13, T.27N., R.60E.
2. Spruce Mountain Ridge- Riepe Spring, Elko Co., Sec. 2, T.32N., R.63E.
3. Spruce Mountain Ridge- Pequop, Elko Co., Secs, 1,2, T.32N. R.63E.
4. Brush Creek, Elko Co., Secs. 11, 13, T.31N., R.64E.
5. Nine Mile Canyon, Elko Co., Secs. 16, 22, T.32N., R.65E.
6. Wood Hills, Elko Co., Sec. 24, T.37N., R.63E.
7. Microwave Tower, Northern Pequop Mountains, Secs. 25, 36, T.38N., R.65E.
8. North of Schell Creek, White Pine Co., Secs. 22, 27, 34, T.25N., R.65E.
9. Spruce Mountain, Elko Co., Secs. 20, 29, T.31N., R.64E.
10. Lone Butte- Riepe Spring, Elko Co.
11. Lone Butte- Pequop, Elko Co., Secs. 31, 32, T.31N., R.62E.
12. Southern Medicine Range- Riepe Spring, Elko Co., Sec. 33, T.27N., R.61E.
13. Southern Medicine Range- Pequop, Elko Co., Sec. 33, T.27N., R. 61E.
14. Ferguson Mountain, Elko Co., Sec. 16, T.30N., R.69E.

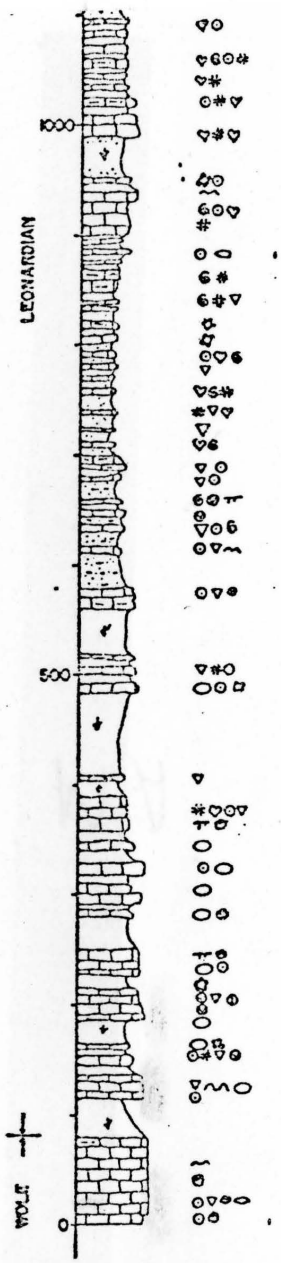
KEY TO STRATIGRAPHIC SECTIONS

Numbers in front of section title refer to numbered locations on the map of page 6. Symbols are below.

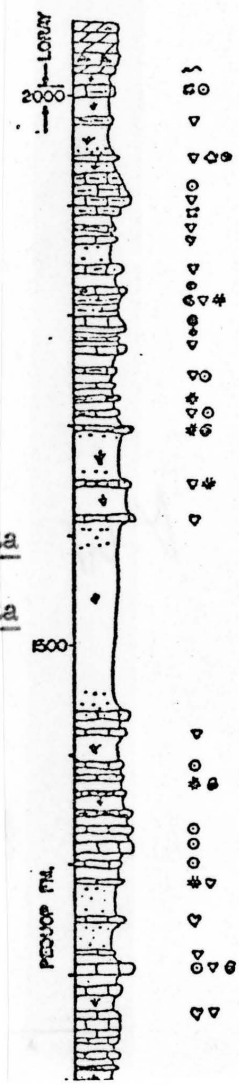
LITHOLOGIC	BIOLOGIC
limestone	dasyclad algae
dolomite	phylloid algae
conglomerate	Tubiphytes?
sandstone	encrusted grain
siltstone	fusulinid
shale	other foraminifera
nodular chert	coral
bedded chert	bryozoan
covered	brachiopod
tectonic breccia	bivalve
break in section	gastropod
igneous	scaphopod
	arthropod
	echinoid

Stratigraphic sections are described in more detail in Marcantel (1973).

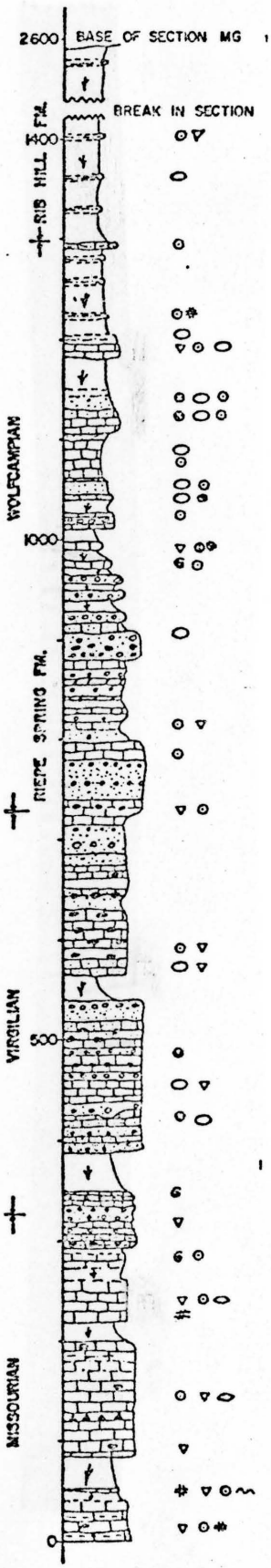
1 MEDICINE RANGE



341 Parafusulina sp.
301 Parafusulina sp.
294 Parafusulina sp.
281 Parafusulina sp.
276 Parafusulina sp.
249 Parafusulina shaksgamensis crassimarginata
234 Schwagerina sp., Parafusulina sp.
228 Parafusulina shaksgamensis crassimarginata
Schwagerina sp.
204 Schwagerina guembeli, Parafusulina sp.
202 Schwagerina crassitectora, Parafusulina
shaksgamensis crassimarginata
201 Schwagerina bellula, Parafusulina sp.
200 Parafusulina sp.
196 Parafusulina sp.
193 Schwagerina bellula, Parafusulina sp.
189 Schwagerina crassitectora
186 Schwagerina crassitectora
118 Schwagerina crassitectora
119 Parafusulina linearis, Schwagerina
franklinensis
12 Schwagerina?
1 Schwagerina sp.



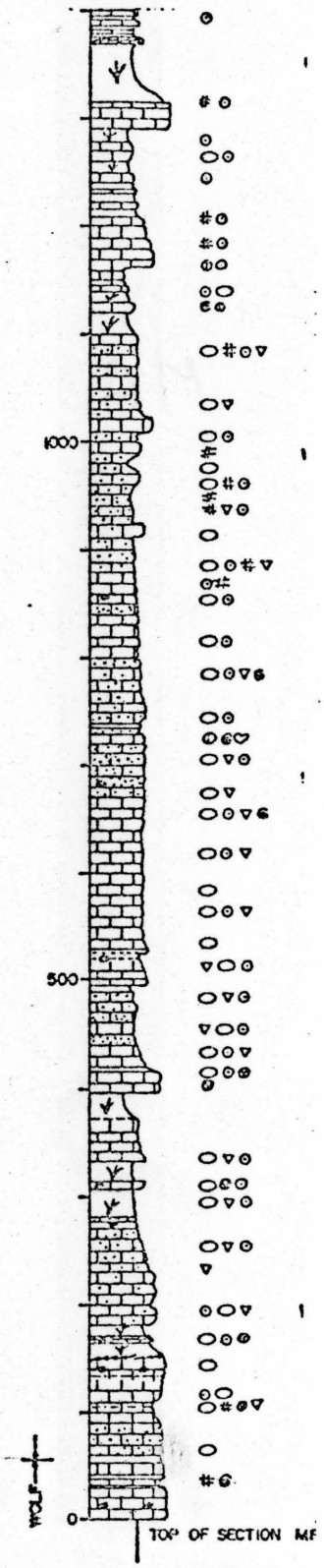
2 SPRUCE MOUNTAIN RIDGE-RIEPE SPRING



1185 Monodiexodina sublinearis
1140 Schwagerina sp.
1110 Schwagerina sp.
1088 Triticites sp.

1021 Triticites sp.

3 SPRUCE MOUNTAIN RIDGE-PEQUOP



1260 not identifiable

1095 Schwagerina sp.
1075 Schwagerina sp.

946 Schwagerina crassitectora

795 Schwagerina crassitectora
775 Schwagerina?

704 Schwagerina guembeli, Schwagerina dispansa

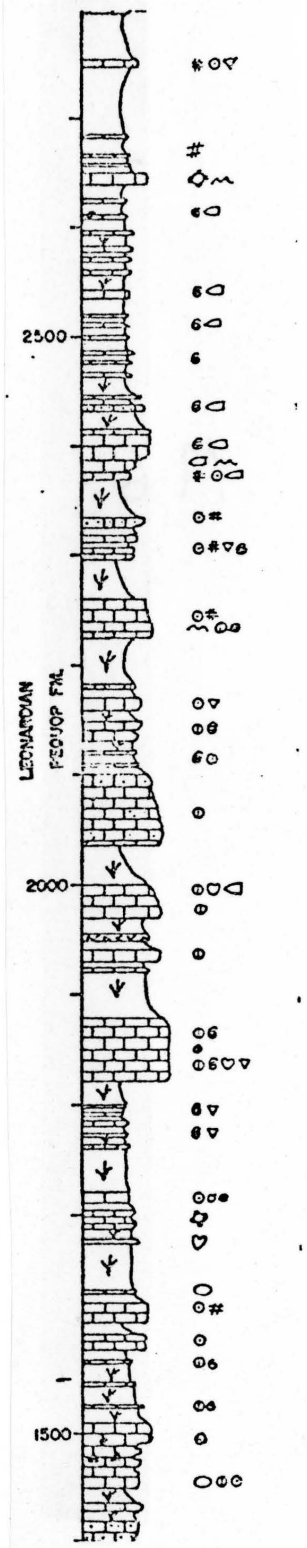
615 not identifiable

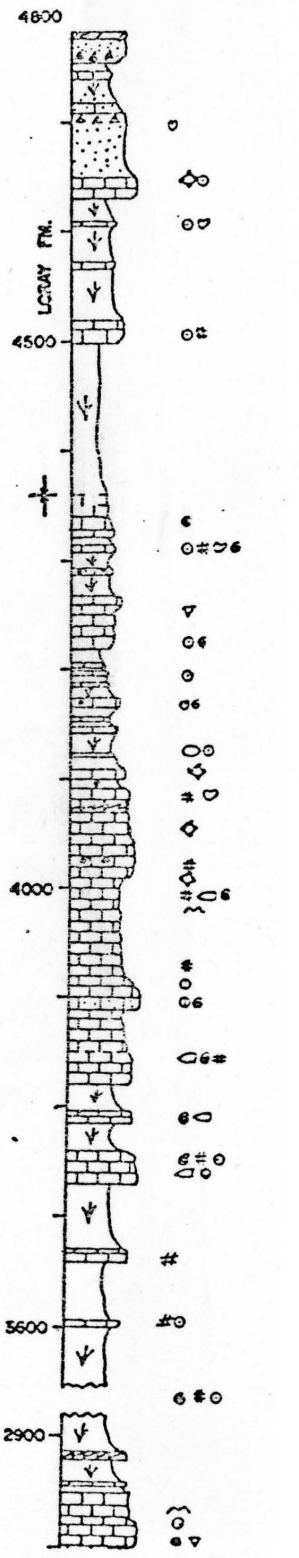
437 not identifiable

120 Schwagerina guembeli, Parafusulina sp.

61 Schwagerina crassitectora, Parafusulina sp.

3 SPRUCE MOUNTAIN RIDGE-PEQUOP



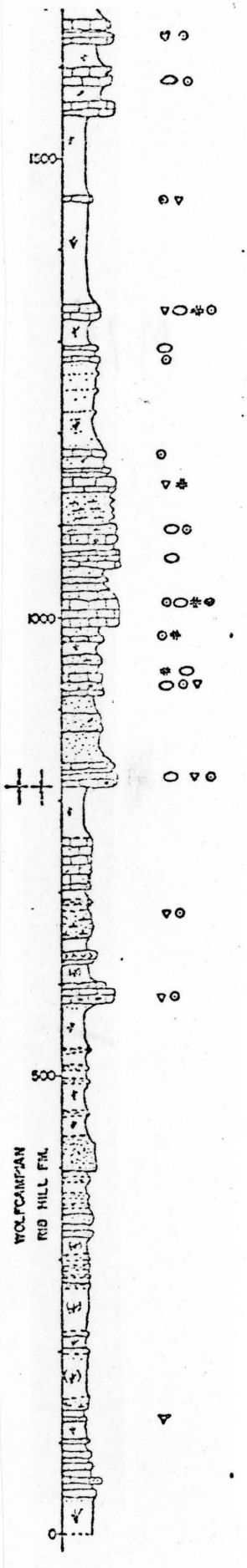


1630 Schwagerina crassitectora

1563 Schwagerina crassitectora, Schwagerina franklinensis

1450 Schwagerina youngquisti

4 BRUSH CREEK



1031 Monodiexodina linearis?

260 Schwagerina sp., Pseudoschwagerina sp.
Pseudoschwagerina texana

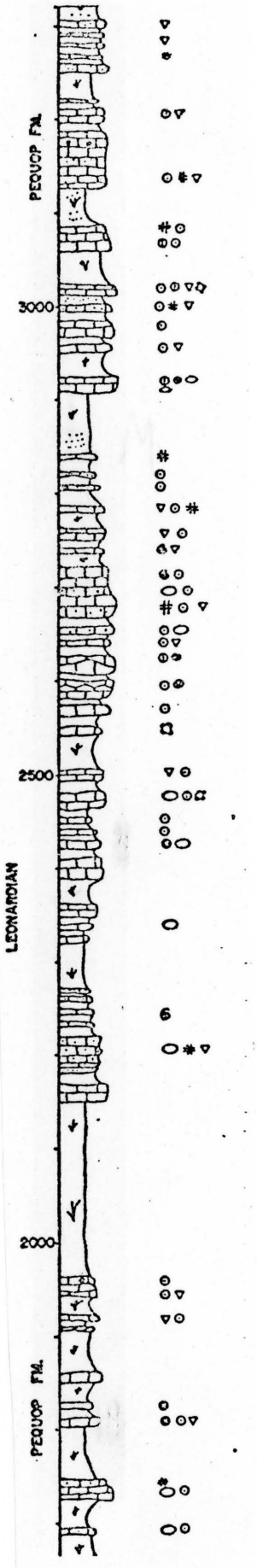
254 Schwagerina longissimoidea

165 Schwagerina sp.

81 Schwagerina eolata, Pseudoschwagerina sp.

7 Schwagerina sp., Pseudoschwagerina sp.

4 BRUSH CREEK



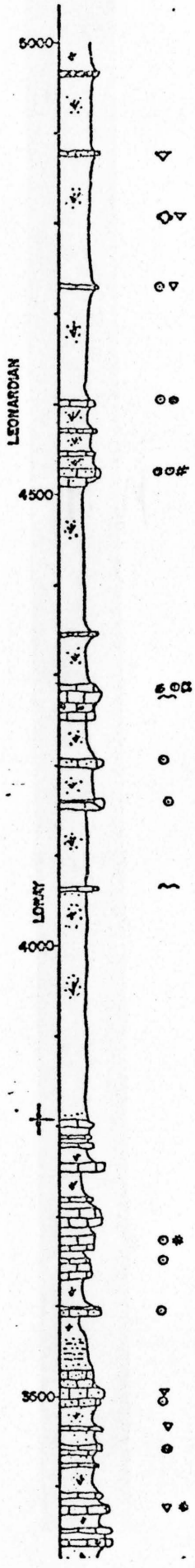
3295 Parafusulina shaksgamensis crassimarginata

2975 Parafusulina shaksgamensis crassimarginata

2918 Parafusulina?

2820 Parafusulina linearis, Schwagerina bellula

4 BRUSH CREEK

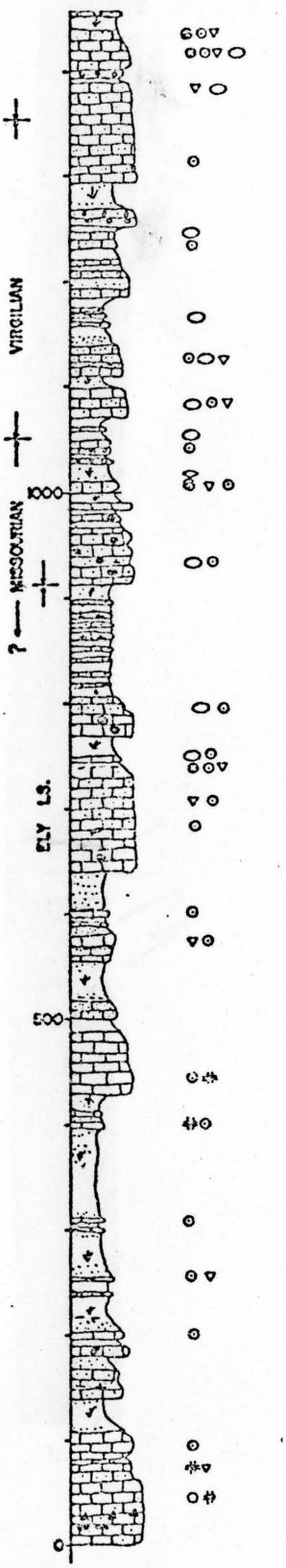


4658 Parafusulina sp.
4628 Parafusulina sp.

4465 Parafusulina sp.

4200 Parafusulina shaksgamensis crassimarginata

5 NINE MILE CANYON



1440 Triticites creekensis

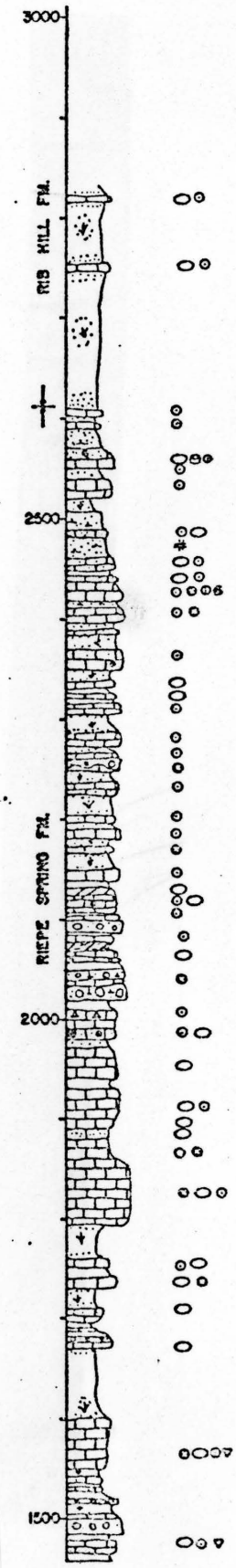
1245 Triticites pygmaeus?

1105 Triticites pygmaeus?

1048 Triticites pygmaeus?

745 Kansannella?

5 NINE MILE CANYON



2915 Schwagerina sp.

2425 Schwagerina sp.
2415 Schwagerina andresensis

2200 Schwagerina wellensis

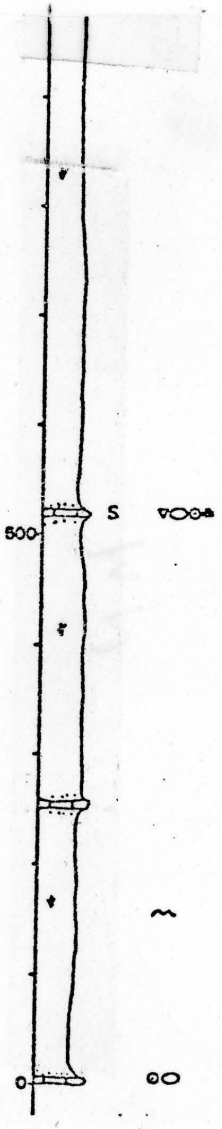
2115 Schwagerina eolata, Schwagerina wellsensis,
Schwagerina andresensis

1970 Schwagerina sp.

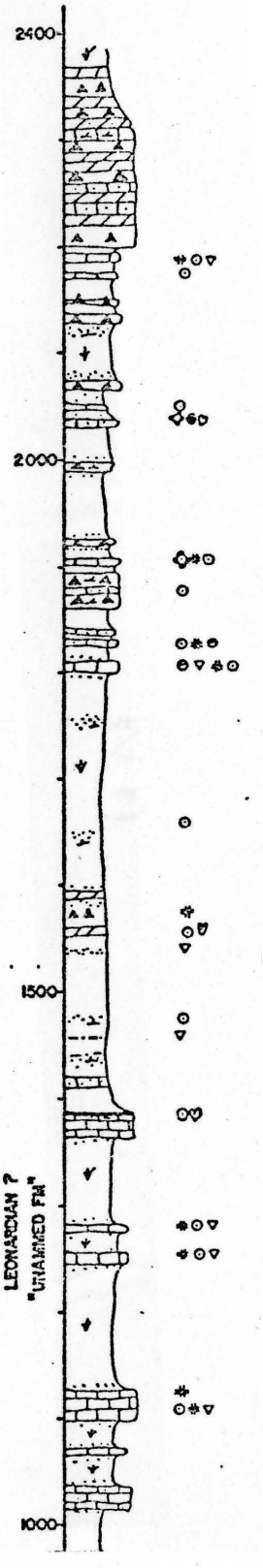
1920 Pseudoschwagerina occidentalis

1710 Triticites cullomensis, Triticites ventricosis,
Triticites hoblensis

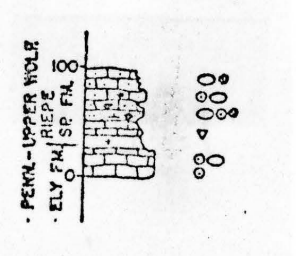
7 MICROWAVE TOWER IN THE NORTHERN PEQUOP MOUNTAINS



560 Schwagerina wellsensis, Dunbarinella wetherensis, Schwagerina longissimoidea

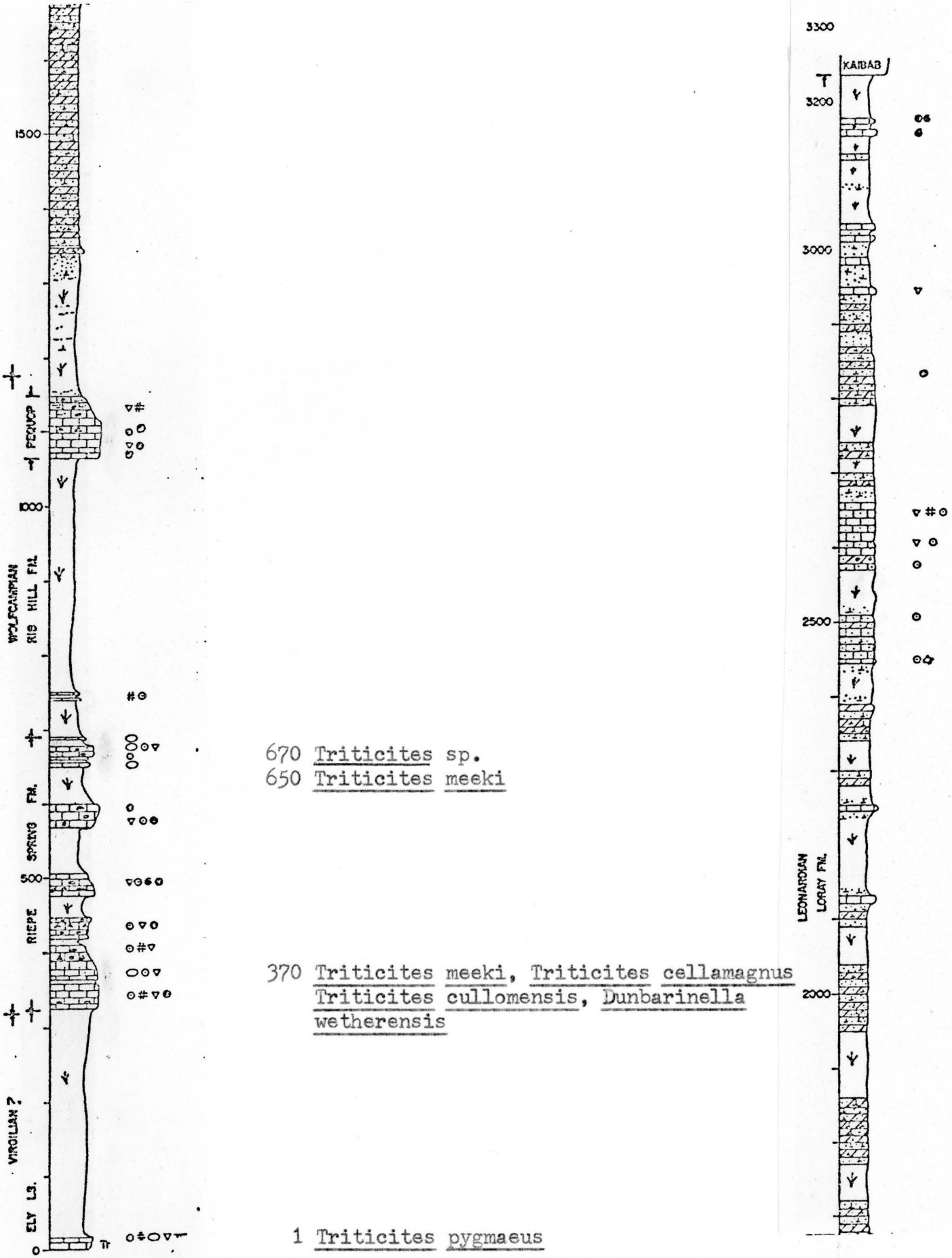


6 WOOD HILLS



65 Schwagerina sp.
45 Schwagerina franklinensis?
27 Triticites sp.

8 NORTH OF SCHELL CREEK

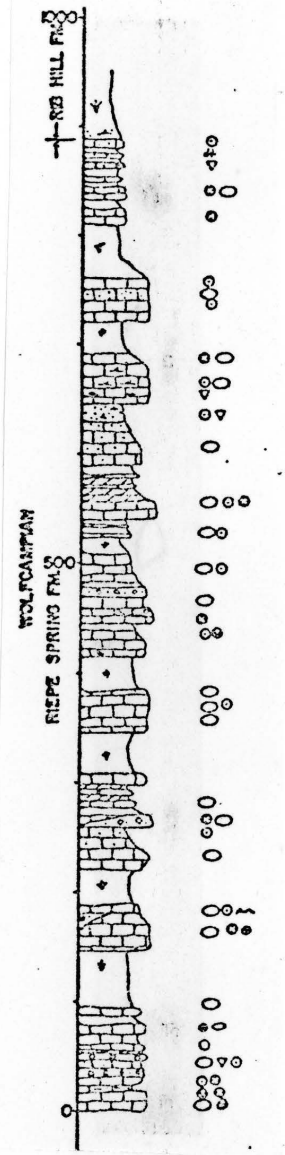


670 Triticites sp.
650 Triticites meeki

370 Triticites meeki, Triticites cellamagnus Triticites cullomensis, Dunbarinella wetherensis

1 Triticites pygmaeus

9 SPRUCE MOUNTAIN



836 Pseudoschwagerina arta

685 Pseudoschwagerina arta, Schwagerina campensis

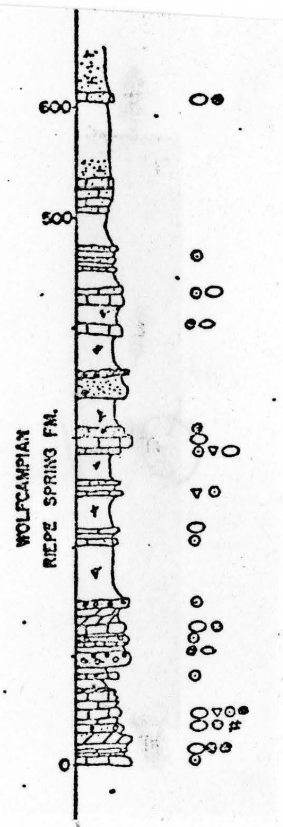
480 Schwagerina sp.

425 Triticites cellamagnus

261 Triticites sp.

172 not identifiable

10 LONE BUTTE-RIEPE SPRING



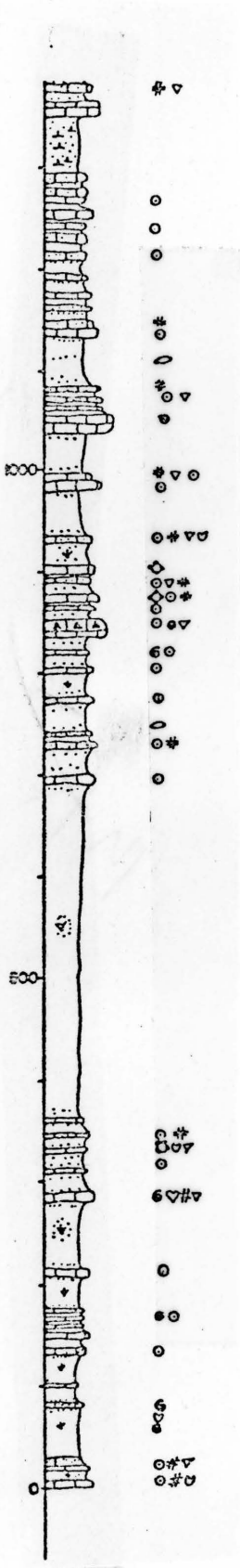
400 Schwagerina campensis, Schwagerina providens

297 not identifiable

44 Triticites sp.

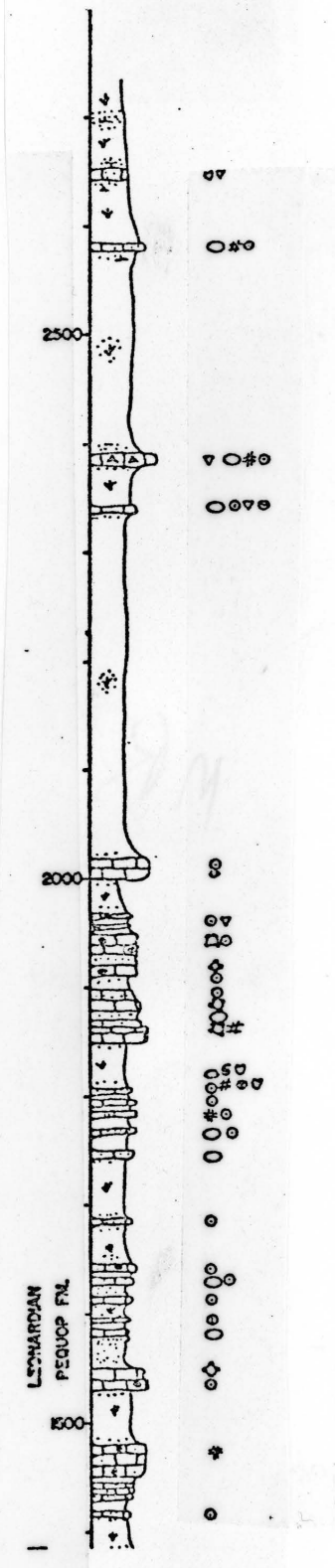
13 not identifiable

11 LONE BUTTE-PEQUOP



740 Schwagerina sp.

11 LONE BUTTE-PEQUOP



2583 Parafusulina sp.

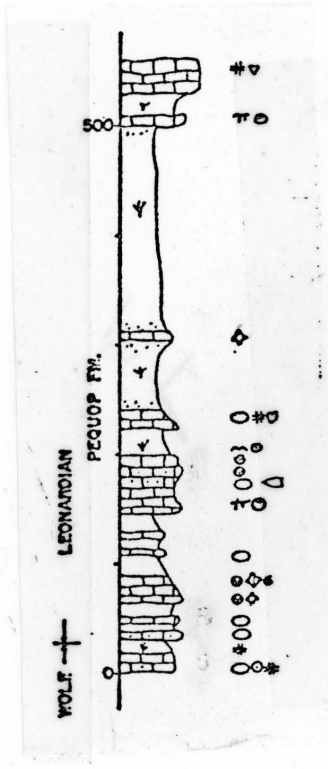
2343 Parafusulina sp.

1810 Schwagerina crassitectora

1655 Schwagerina crassitectora

1590 Schwagerina sp.
1575 Schwagerina sp.

13 SOUTHERN MEDICINE RANGE-PEQUOP



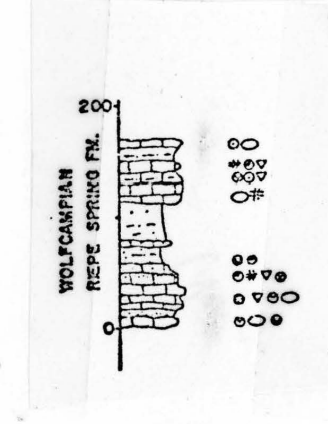
240 Schwagerina sp.

130 Schwagerina sp.

38 Schwagerina dispansa, Schwagerina crassitectora, Schwagerina bellula, Parafusulina shaksgamensis crassimarginata

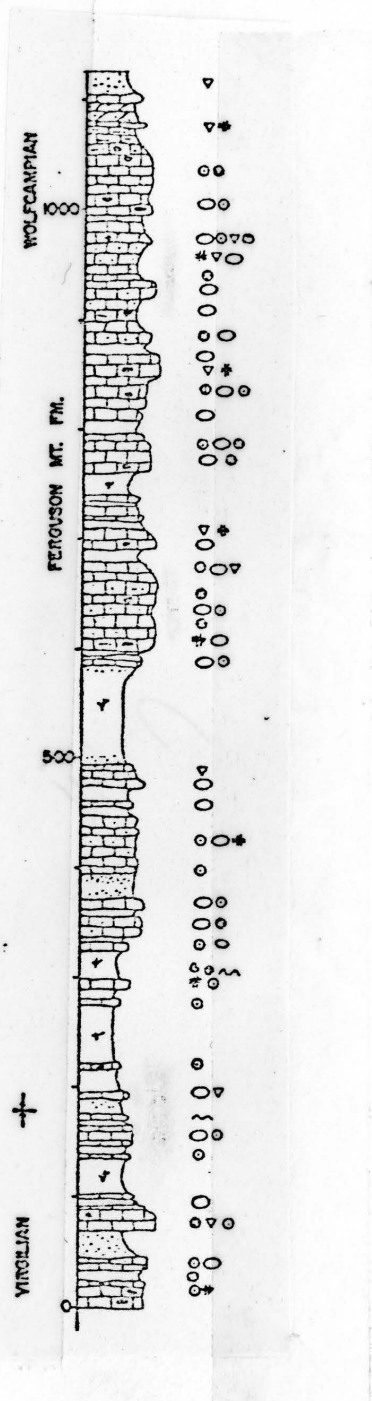
0 Schwagerina dispansa

12 SOUTHERN MEDICINE RANGE-RIEPE SPRING



1 Schwagerina wellsensis

14 FERGUSON MOUNTAIN



1080 Pseudoschwagerina sp.
1045 Pseudoschwagerina arta

910 Pseudoschwagerina sp.

841 Pseudoschwagerina uber, Pseudoschwagerina needhami, Schwagerina morsei, Schwagerina neolata

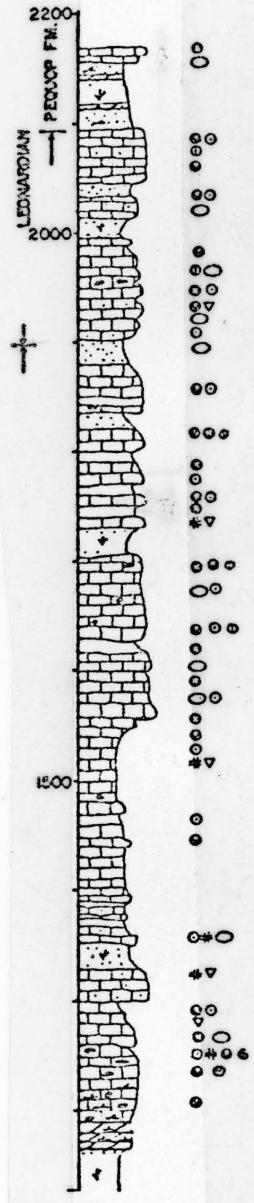
680 Schwagerina campensis, Schwagerina longissimoida
679 Schwagerina wellsensis, Schwagerina andresensis, Schwagerina providens, Schwagerina longissimoida, Schwagerina eolata, Schwagerina campensis
655 not identifiable
635 not identifiable

490 Triticites hobblensis, Triticites cullomensis, Pseudofusilinella occidentalis
461 Triticites meeki, Triticites hobblensis, Triticites cullomensis
331 Triticites ventricosis, Triticites hobblensis, Triticites cellamagnus
275 not identifiable

192 Triticites cullomensis, Triticites hobblensis

147 Triticites pygmaeus
92 Triticites pygmaeus, Pseudofusilina utahensis

14 FERGUSON MOUNTAIN



2140 Schwagerina guembeli, Schwagerina crassitectora

1980 not identifiable

1555 not identifiable

1335 Pseudoschwagerina sp.

1255 Schwagerina sp.

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